PLANNING FOR AN INTEGRATED AREA DEVELOPMENT A CASE STUDY OF KARWI TAHSIL, DISTRICT BANDA

A Thesis Submitted to the
Bundelkhand University, Jhansi
for the Degree of
Doctor of Philosophy
IN
Geography

8591

Under the Supervision of
Dr. R. L. TRIPATHI
Head, Department of Geography
Atarra P. G. College, Atarra

By
MAHESH CHANDRA AGNIHOTRI

DEPARTMENT OF GEOGRAPHY
ATARRA P. G. COLLEGE ATARRA
(BANDA)
1987

CERTIFICATE OF THE SUPERVISOR

Certified that Shri Mahesh Chandra Agnihotri has worked for the required period of time under ordinance (7) under my supervision for the degree of Doctor of Philosophy in Geography on the topic 'Planning For An Integrated Area Development : A Case Study of Karwi Tahsil, District Banda'. The accompanying thesis submitted by him embodies the work of the candidate himself and it is an original work.

Date: 8.2.1987

(Dr. R.L. Tripathi)
Head, Department of Geography
Atarra P.G.College, Atarra
Banda (U.P.)

ACKNOWLEDGEMENTS

It is my proud privilege and solemn duty to express my deepest sense of gratitude to Dr. R.L. Tripathi, Head Department of Geography, Atarra P.G. College, Atarra (Banda), whose able guidance and unfailing encouragement enabled me to complete this work.

I gratefully acknowledge the valuable assistance rendered by my teachers particularly Dr. R.C. Dwivedi, Dr. R.K. Shukla, Dr. R.S. Tripathi and Shri R.C. Agnihotri. I express my sincere gratitude to Prof. A.K. Goswami, Head, Department of English, Atarra P.G. College for going through the manuscript and suggestions. I owe a deep debt of gratitude to Dr. R.C. Sharma, Deptt. of Geography, P.P.N. College, Kanpur for discussing with him a number of problems connected with my work. I am obliged to Tahsildar, Karwi, B.D.Os of Karwi, Pahari and and Manikpur and District authorities for providing published and unpublished data for the work as well as to the people of the tahsil who were consulted during the field work.

I offer sincere tribute of gratefulness to my wife Smt. Sunila Agnihotri and sister-in-law Smt. Gita Agnihotri for providing a convivial and stimulating environment for such study.

Mahesh Chandra Agnihotri

Vasant Panchami
Feb. 3, 1987.

(Mahesh Chandra Agnihotri)

C_O_N_T_E_N_T_S

		PAGE NO
Certificate		i
Acknowledgements		ii
List of Illustrations		vi-viii
List of Tables		ix-xi
Abbreviations		xii
CHAPTER I	: INTRODUCTION	1 - 65
	Thematic Frame; Conceptual Background, Chronological Perspective. Research Design, Objectives, Data Base, Methodology. The Study Area; Location and Extent, Administrative Set-up, Physical Features-Geology, Relief, Drainage, Climate, Soils Vegetation, Wild Life.	
CHAPTER II	: SETTLEMENT AND POPULATION PATTERN	66-109
	Settlement Pattern; Size of Settlements Density and Spacing, Pattern of Dispersion, Types of Settlements, Population Pattern; Population Growth, Density, Decade Variation, Population Breakup-Sex Composition, Literacy, Scheduled Castes and Scheduled Tribes Population. Working and Non-working, Population, Occupational Structure.	
CHAPTER III	: SPATIAL STRUCTURE OF ECONOMY	110-174
	Agriculture; Landuse Pattern - General Landuse, Agricultural Landuse, Production and Productivity, Levels of Agricultural Development. Animal Husbandry; Livestock Composition and Distribution, Livestock Land/Man Ratio, Livestock Products, Dairying, Poultry Farming, Pig Husbandry, Fisheries. Mining;	

PAGE NO.

Distribution and Production of Minerals. Forestry; Types of Forests, Distribution of Forests, Forest Products, Afforestation. Industry; Industrial Structure, Spatial Distribution of Industries, Industrial Employment.

CHAPTER IV : SPATIAL ANALYSIS OF CENTRAL PLACES 175-208

Central Place-Conceptual Frame Central Functions;Clustering of Functions, Functional Hierarchy. Identification and Hierarchy of Central Places; Space Preference Method, Relative Centrality Method, Scalogram Method. Spatial Pattern of Central Places, Spatio-functional Gaps.

CHAPTER V : SPATIAL ORGANISATION OF INFRA-STRUCTURAL PURSUITS 209-256

Education;Primary Schools,Junior High Schools, High Schools, Intermediate Colleges, Training Institution and Sanskrit Vidyalayas. Health; Health Care Facilities-Private Medical Practitioners, Health Assistants, Health Sub Centres, Dispensaries, Primary Health Centres, Hospitals,Drinking Water Facilities. Communication; Postal Facilities,Transport Facilities-Structure of Transport net work, Accessibility. Electricity; Rural Electrification. Markets; Daily Markets, Periodic Markets. Agro-Economic Pursuits; Agricultural Pursuits Irrigation System, Extension Services, Credit Pursuits-Banks, Societies.

CHAPTER VI : IDENTIFICATION OF PLANNING UNITS AND AND APPROACHES FOR INTEGRATED AREA DEVELOPMENT 257-326

Identification of Planning Units;

PAGE NO

Demarcation of Influence Zone, Delineation of Planning Units. Planning Approaches; Estimation of Population, Planning for Resource Development-Land Resource, Water Resource, Forest Resource, Livestock Resource, Mineral Resource, Human Resource, Planning for Agricultural Development Identification of Potential Agricultural land, Irrigation cropping Pattern, Input Provisions, Planning for Industrial Development-Strategy for Industrial Development, Proposals for Industrial Development, Planning for Socio-Economic Infrastructure-Education, Health, Communication, Power and Rural Electrification, Markets, Extension Services and Credit Facilities, Planning for Spatial and Functional Integration, Motivation Pattern-Development of Weaker Sections, Improvement in Environmental Qualities, Action Strategy.

CHAPTER VII : SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS 327-343

BIBLIOGRAPHY 344-353

APPENDIXES 354-373

...

LIST OF ILLUSTRATIONS

Fig.No.		Caption
1.1		Conceptual Frame
	A.	Model For Integrated Area Development Plan.
	B.	Bases , Factors of Integration and the Limitations of the Concept of Integrated Area Development.
	C.	Three Dimensional Concept of Integrated Rural Area Development.
1.2		Administrative Setup.
1.3		Physical Features.
	A.	Geology.
	B.	Relief.
	C.	Drainage.
	D.	Depth of Water Table.
1.4	A.	Climatic Characteristics.
	B.	Soils.
2.1	A.	Concentration of Rural Settlements.
	B.	Size of Rural Settlements.
	C.	Relationship Between Population and Settlements.
	D.	Relationship Between Population, Area and Rural Settlements.
	E.	Relationship Between Settlements and Area.
2.2		Characteristics of Rural Settlements.
	A.	Density and Spacing.
	B.	Relationship Between No.of Settlements Area and Rn Index.
	C.	Range of Random Matching.
	D.	Nature of Dispersion.
	E.	Types of Rural Settlements.

Fig.No.		Caption
2.3	A.	Growth o f Population.
	B.	Arithmetical Density.
2.4	A.	Decade Variation.
	B.	Decade Variation : Changing Pattern.
2.5	A.	Sex Ratio.
	B.	Sex Ratio Variation.
2.6	A.	Literacy.
	B.	Scheduled Castes Population.
2.7		Percent of Main Workers to Total Population.
2.8	A.	Co-relation Between Cultivators & Agricultural Labourers.
	B.	Location Quotient for Agricultural Employment.
	C.	Occupational Structure.
3.1	A.	General Land Use.
	B.	Agricultural Landuse.
3.2		Spatial Pattern of Crops.
3.3		Crop Ranking.
3.4	A.	Crop Combination Regions.
	B.	Cropping Intensity.
3.5	A.	Production of Crops.
	B.	Agricultural Productivity.
	C.	Levels of Agricultural Development.
3.6		Livestock Resource.
	A.	Livestock Composition.
	B.	Livestock Density.
	C.	Livestock- Man Ratio.
	D.	Draught Animal-Land Ratio.
	E.	Milchstock-Man Ratio.
	F.	Estimated Livestock Manure.
3.7	A.	Minerals.
	B.	Forest-Administrative Units.

Fig.No.		Caption
3.8		Industries.
	A.	Distribution.
	B.	Growth
	C.	Structure and Employment.
4.1	A.	Settlements with clusters of Functions.
	B.	Size Distribution of Settlements.
4.2		People's Choice of Centres.
4.3		Functional Scalogram.
4.4	A.	Spatial Distribution and Hierarchy of Central Places.
	B.	Spatial Organization of Central Places (2001 AD).
5.1		Cumulative Frequency Curves of All Settlements and the Settlements Having the Functions.
5.2		Facilities.
	A.	Educational.
	B.	Health.
5.3		Facilities.
	A.	Communication.
	B.	Market and Electric.
5.4		Transport.
	A.	Rail and Road Reticule.
	B.	Accessibility.
5.5		Irrigation.
	A.	Irrigated Area.
	B.	Irrigation Network.
5.6		Facilities.
	A.	Extension.
	B.	Credit.
6.1		Planning Units.
	A.	First Order.
	B.	Second Order.

...

LIST OF TABLES

Table No.	Caption
1.1	Geological Succession.
1.2	Depth of Water Tables in Wells.
1.3	Climatic Elements.
1.4	Executed Area Under Soil Conservation.
2.1	Size of Settlements.
2.2	Nature of Dispersion of Rural Settlements.
2.3	Population Growth.
2.4	Density of Population.
2.5	Population Variation.
2.6	Sex Ratio.
2.7	Literacy.
2.8	Scheduled Castes and Scheduled Tribes Population.
2.9	Main Workers, Marginal Workers and Non-workers.
2.10	Occupational Structure of Population.
3.1	General Landuse.
3.2	Changing Pattern of Landuse.
3.3	Area Under Different Crops.
3.4	Indices of Agricultural Development.
3.5	Distribution of Livestock Resource.
3.6	Livestock Land/Man Ratio.
3.7	Milk Procurement by the Society.
3.8	Area Under Pisciculture.
3.9	Production of Fish and Revenue.

Table No.	Caption
3.10	Bauxite Reserves.
3.11	Production of Bauxite.
3.12	Distribution of Forests.
3.13	Major Forest Products.
3.14	Tendu Leaves-Production and Revenue.
3.15	Progress in Plantation.
3.16	Industrial Structure.
4.1	Clustering of Functions.
4.2	Functions with Entry Point (Threshold).
4.3	Hierarchic Groups of Functions (Based on Population Threshold).
4.4	Median Population Threshold and MPT Indices of Functions.
4.5	Hierarchic Groups o f Functions (Based on Median Population Threshold).
4.6	Centrality Index and Centrality Rank of Centres.
4.7	Spatial Characteristics of Central Places.
4.8	Existing and Required Number o f Central Places.
5.1	Educational Facilities.
5.2	Health Facilities.
5.3	Communication Facilities.
5.4	Under Construction Roads.
5.5	Physical Accessibility by Railways and Roads.
5.6	Electric Facilities.
5.7	Market Facilities.

Table No.	Caption
5.8	Salient Features of Canals.
5.9	Lift Canals - Salient Features.
5.10	Extension Services.
5.11	Credit Facilities.
6.1	Number of villages and Population Served by the Fourth Order Central Places.
6.2	Number of Villages and Population Served by Third Order Central Places.
6.3	Projected Population.
6.4	Proposed Landuse.
6.5	Area of Existing and Proposed Reservoirs for Development of Pisciculture.
6.6	Proposed Irrigated Area.
6.7	Distribution and Requirement of Fertilizers.
6.8	Proposed Industries.
6.9	Requirement of drinking water.

...

ABBREVIATIONS

AAAG	:	Annals, Association of American Geographers.
ICAR	:	Indian Council of Agricultural Research.
IIPA	:	Indian Institute of Public Administration.
GSI	:	Geological Survey of India.
NCAER	:	National Council of Applied and Economic Research.
NICD	:	National Institute of Community Development.
NGSI	:	National Geographical Society of India.
UBBP	:	Uttar Bharat Bhoogol Parishad.

...

CHAPTER - I

INTRODUCTION.

Thematic Frame

Regional Planning is widely recognised as the most effective device of economic development. It is being implemented for the betterment of society in India on micro level areas and has two basic aims :

(i) Economic growth by providing infrastructure and (ii) Investment on economic activities and social change by creating employment possibilities for weaker sections. The exigency of balanced and multi-dimensional development planning need not be over-emphasized for a country like India with so much socio-economic stresses and strains[1]. Since independence, the design of our national plan was purely economic-sectoral, both theoretically as well as practically characterised with lack of coordinated and integrated approach to planning and development as a most potent and conspicuous factor. Although such planning approaches set the country in the positive direction of over all development, yet regional and social imbalances, created by such development cannot be overlooked. These imbalances can be corrected, as the Planning Commission has emphasized by grassroots level or micro-level planning based on available local resources and the village community[2].

In India, the rural development programmeshave so far proceeded on the assumptions : First, that the village

communities are sufficiently compact units, entitled for concentration of planned development. Secondly, the infrastructural development, needed for socio-economic reconstruction, has to be provided for larger territorial areas. The Community Development Block supported by Nayay Panchayat institutions is the local unit for development-administration to the millions in the country side. As the sectoral and temporal programmes undertaken by C.B.D. have seldom had a strong methodological base aimed to promote growth and integrated development, it is but natural that their impact would be uneven, insignificant and sporadic. In these programmes, the spatial nature of functional integration has been found neglected.

Planning in rural areas now must be increasingly designed so as to serve continued agricultural progress and at the same time to preclude the evils which could result from improper managed agricultural prosperity and to ensure optional economic and social returns on the investment made within the sector. For this, it is necessary to relate sectoral and temporal programmes to spatial constraints and physical needs[3]. Moreover, the major financial, economic, administrative and cultural institutions are located in large centres creating a socio-economic gap 'known as development dualism' between the centres and its peripheral areas. It is, therefore, necessary to eliminate this functional

friction between highly developed centres and complementary areas as much as possible. All this only can be achieved by integrated area development planning.

CONCEPTUAL BACKGROUND

The concept of 'Integrated Area Development' is gaining momentum since last 30 years or so and may be referred to an idea of comprehensive planning. The goal of integrated area development is to spread the benefits of development to the largest number of persons even in the remotest area during the shortest period of time. It is a promise for providing missing links in our planning efforts.

In recent years, in all planning processes, emphasis has been placed on integrated planning but the concept of integrated area development and methods of achieving it have not yet been set forth clearly[4]. The term 'Integration' is rather a nebulous expression and has been interpreted in many ways[5]. In term of any action programme it is more than bring together into a 'whole'. Some have used the word to describe a system of inter-relationship between activities falling within different sectors of development. Others regard it as a substitute for processes by which a group of activities is proposed and decided upon. Many others are contended to regard it as a manner in which some special programmes or activities are linked to the general framework

to obtain optimum results[6]. In the present context the term may be defined as the planning approach which may improve the socio-economic life of the people by the optimum utilization of local natural and human resources. The framework of area development comprises of land type, land-use, settlement structure both urban and rural, social and economic infrastructures and their existing as well as proposed relationship. Thus, the concept of Integrated Area Development may be explained as a planning process and a strategy for improvement of the socio-economic life of the people in an area by bringing about, the necessary structural, institutional and attitudinal changes and by providing a package of facilities through extension services.

Integrated area development combines three types of integration i.e. spatial, functional and timal which are also integrated in various complex forms (Fig. 1.1A). The spatial integration indicates the locational aspects of social and economic activities in which all the settlements in space are involved. Socio-economic activities are clustered or distributed according to the hierarchy of settlements and linkage of transport arteries and communication. Functional integration, the other aspect of issue, implies to co-ordinate expansion of various social and economic services, necessary for human life, like agriculture, industry, transport, health, education housing etc. These services help to speed up the pace of development of a region. Functional integration is thus, based upon the idea of complementarity between various sectors and is comparable

to an approach of balance growth at micro-level. An understanding of functional inter-relationships in space, therefore, goes a longway towards development of an area[7].

The third dimension of integrated area development concept refers to time. Time perspective plans are basic requirement for focussing the development processes in a particular region. On the basis of present need, resource potentials and future possibilities, a number of plans of different time span can be worked out in the view of maintaining a progressive harmony between growing population and depleting resources.

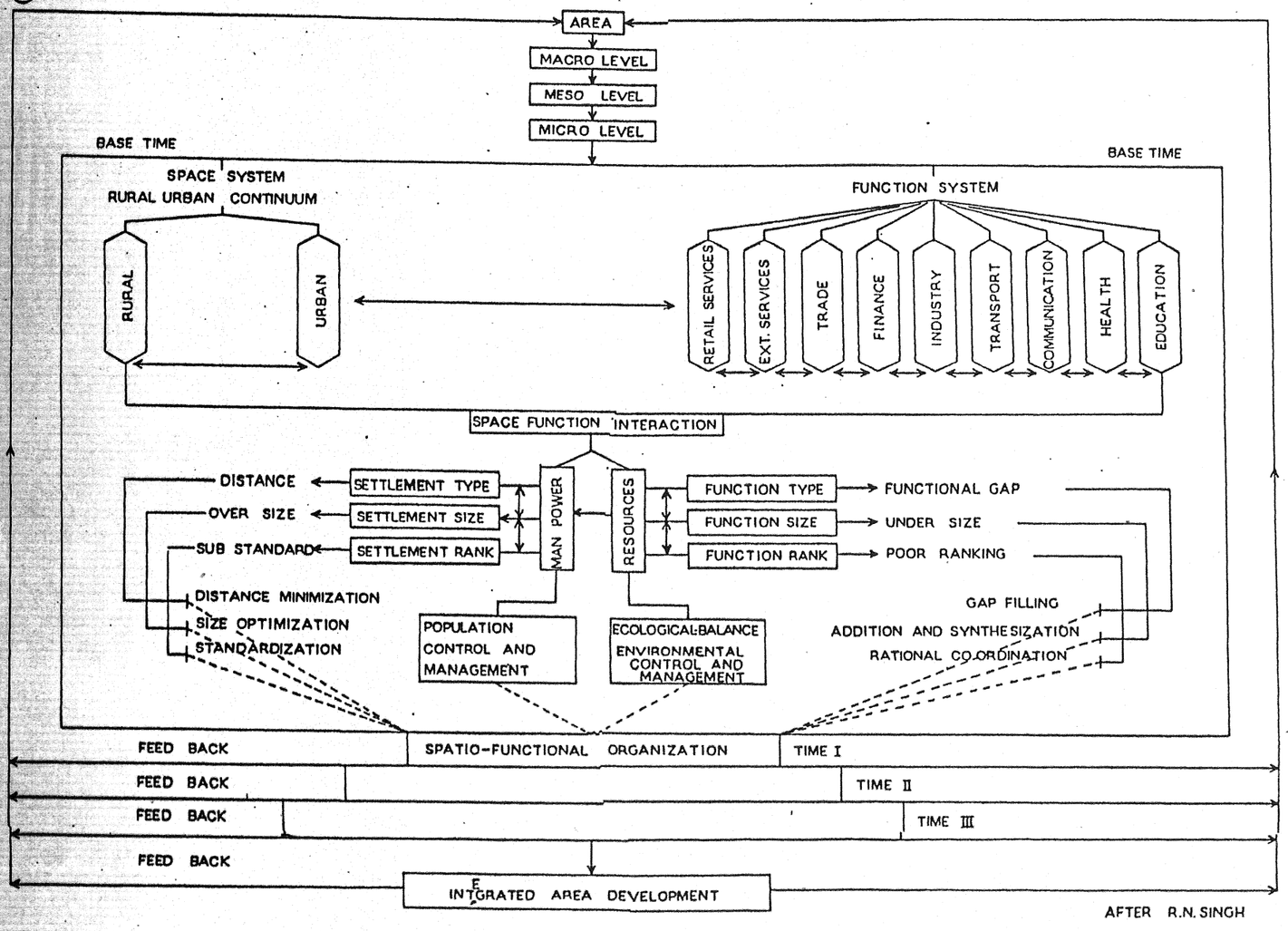
The concept of integrated area development is quite different in approach from sectoral planning which has to be studied more intensively in geographical frame of areas at micro-level. The study of the size, function and distance relationship of human settlements and appraisal of the potential wealth of natural resources of the area concerned, is pertinent to undertake such planning projects of integrated area development[8].

Integrated area development, thus, refers to the appropriate location of social and economic activities over a physical space for the balanced development of a region[9]. The distributional pattern of social and economic activities exhibits a definite pattern and areas of concentration and

CONCEPTUAL FRAME

MODEL FOR INTEGRATED AREA DEVELOPMENT PLAN

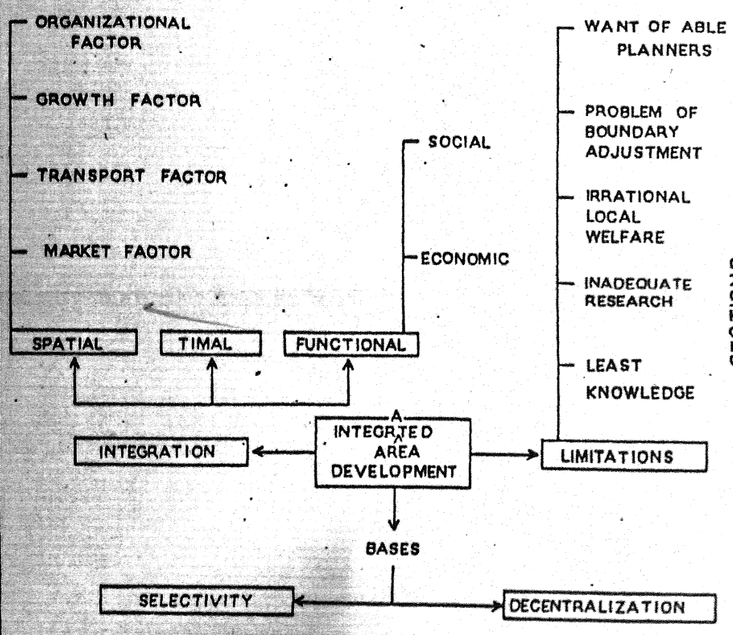
Ⓐ



AFTER R.N. SINGH

BASES, FACTORS OF INTEGRATION AND THE LIMITATIONS OF THE CONCEPT OF INTEGRATED AREA DEVELOPMENT

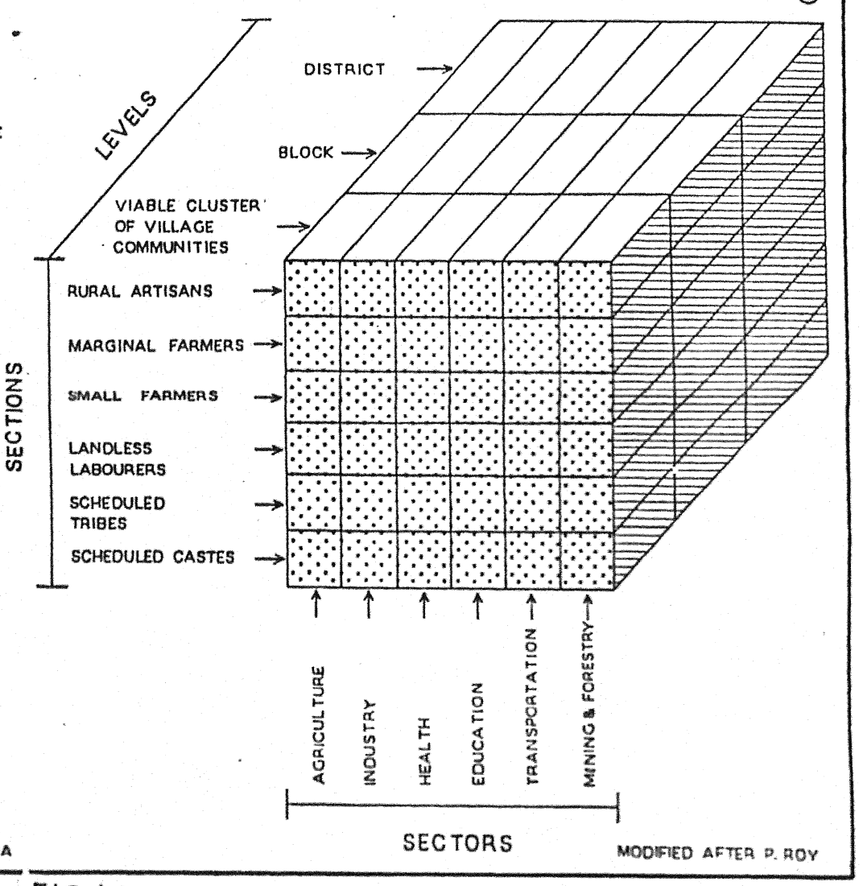
Ⓑ



MODIFIED AFTER R.C. SHARMA

THREE DIMENSIONAL CONCEPT OF INTEGRATED RURAL AREA DEVELOPMENT

Ⓒ



MODIFIED AFTER P. ROY

mca

FIG. 1.1

dearth of these activities are well marked side by side. In planning processes, preference should be given to these backward areas for locating new functions and infrastructural development. 'Integrated area development is, thus, based on the ideas of selectivity on the one hand and decentralization on the other[10]. Irrespective of the level of development in any area, the selectivity and decentralization refer to local and regional level respectively. Decentralization should be practised between areas of concentration and dearth not between rural and urban areas, as rural urban dichotomy would be harmful in the view of the development of a region. Thus, the concept of integrated area development suggests a framework for decentralizing economic and social activities by locating specific functions in appropriate places and provide a base for sustaining a diversified and growing economy[11]. Although the approach for integrated area development has been considered as remedial measures for improvement in quality and effectiveness in future development plan and correction of errors of post economic growth yet limitations of this complicated task cannot be overlooked. These limitations create restricting conditions in actual execution of Integrated area developmen

plan. The bases, factors of integration and limitations of concept of integrated area development have been illustrated in Fig. 1.1B.

Integrated Area Development vis-a-vis Integrated Rural Development

Integrated rural development means the optimum utilization of the natural and human resources of a given rural area for the enrichment of the quality of life of its population. Optimum utilization should take into account not only production but also distribution, employment, upliftment of rural poor above poverty line and environmental harmony[12]. Unlike all the previous rural development programmes such as Community Development Programmes (C.D.P.), Small Farmers Development Agencies (S.F.D.A.), Command Area Development Authorities (C.A.D.A.) and Drought Prone Area Development Programmes (D.P.A.P.), Integrated Rural Development Programme (I.R.D.P.) is designed to generate full employment in rural community through intensification of development programmes based on available resources and man power skill. Integrated Rural Development has been considered as three dimensional[13] i.e. a multi-sector, a multi-section and multi-level concept (Fig. 1.1C).

Integrated area development in micro-level settings generally refers to development of rural areas[14]. It is a

system-oriented approach to rural planning. Though economic growth with social justice and regeneration of backward agrarian rural society have been designed as basic goal of all the area development programmes, horizon of the concept, however, should never be confined to rural and rural areas alone. The term 'Integrated Area' denotes the space continuum consisting of both rural and urban and their inter-relation in various combinations. Any duality of rural and urban development would be an anti-thesis to the very concept of integrated area development[15]. That's why, the integrated area development is often equated with integrated rural (area) development.

Integrated Area Development and Micro-Level Planning

The integrated area development planning strategy ensures to provide not only the agricultural inputs but also the socio-economic facilities, necessary for development of an area. These facilities and investments can not be provided at village level. It is noticeable that a number of villages have a tendency to cluster around a common centre for particular function[8]. Studying the pattern of frequency distribution between individual villages and different places, the emotional and physical linkages of each village to particular centre can be visualized. The study of functional relationship of the centres reveals that the primary centres to which

villages are linked, are functionally related with higher order centres termed as towns and cities. Thus, a micro-region can be demarcated easily, by identifying a common centre, creating to varied need of a large number of villages through subsidiary centres. These micro-level regions are the ideal units at lowest level area for planning and development purposes. Thus, several sub regions can be visualized on a hierarchic scale with progressively increasing geographical area and population base and with service centres and growth centres of functional complexity.

Micro-level planning, one of the best methods to implement integrated area development, is not limited to any particular level of settlement. It decides the hierarchy of central places and their hinterlands. The location of specific activities and their interlinkages over a region are major concerns of micro-level planning. For the location of any activity or investment, the study of local problems and assessment of local resources are of prime importance which is possible only at micro-level. Besides, as a multi level concept, it normally encompasses the micro-levels of space such as village, the viable cluster of villages of nyay panchayat, block and district[16]. Thus, it may be concluded that integrated area development within the framework of micro-level will be most suitable plan for over all development of a region and thereupon integrated area development and micro-level planning become integral components of

each other.

CHRONOLOGICAL PERSPECTIVE

There are not ample evidences to trace the exact origin of planning thought, though it is believed that regional planning was practised in ancient times as a tool for the economic development of resources in a region[17]. After second world war, the majority of developing countries adopted planning as an innovations and established different central planning agencies. However, the approach of integrated area development was enunciated for the first time in U.S.A. in the form of introductory policy of regional planning[18]. In India, the history of integrated development generally reflects the development of rural areas.

The concept of integrated area development is the most recent product of our planning practices and experiences. The work related with the concept may said to have been brought out in the beginning of the fifties of the present century. It has gained currency only during the last few years in its true scientific meaning[19]. A chronological account of the progress of the theme of integrated area development may be assessed on decadal bases beginning from 1950 s.

Progress During Fifties

The studies on micro-level planning have been conducted

at district and taluka level as an experiment of integrated area development to achieve the state of balanced regional development from early fifties of present century. The role of central functions in the grouping of localities has been recognised by Hens Bosch[20], in 1952 and probably he may be referred to as the postulator of the concept of the integrated area development. The application of location and central place theory, for the balanced regional development planning, has probably accepted in European countries like Yugoslavia, Bulgaria and Poland. Up to 1960, the regional approach could get some acceptability in European countries which led the way for providing feasibility and field of proper nourishment to concept of integrated area development in western world[21].

Progress During Sixties

In early sixties, emphasis was laid on the rural-urban development planning through application of techniques of integrated area development in France and Germany[22]. M.V.R. Shashtri[23] (1965) presented two integrated models of economic planning for U.S.A. suggesting balanced regional development plan, one at national level and another at regional level. In 1965, Indian Council of Applied Economic Research[24] endeavoured to bring out a report on the market towns and spatial planning. It was first attempt in India on the theme of an integrated area development. The empirical observations,

obtained in Corsica by I.B.Thompson[25] proved very helpful for suggesting remedial measures of regional planning for development of country side environment. Hilling[26] (1968) suggested an integrated rural development plan for Wales, working on the lines of work already started in France and Scottland. In 1968, the Ministry of community development had submitted a proposal for pilot study of viable rural communities in 40 blocks. The preliminary report on the pilot project for integrated area development could become available in May 1969[27].

H.D. Clout[28] (1969) studied the European environment for integrated area development planning in the country side. Skinner's[29] work on China concluded that market centres should be developed proportionately to cater to the needs of surrounding settlements on the basis of facilities available. Organization of European Community Development (O.E.C.D.) in Paris, laid stress upon limitations of integrated area development and submitted an account on the multi disciplinary aspects of regional development.

Progress During Seventies

With the advent of the Fourth Five Year Plan, geographers, regional planners, economists and sociologists emphasized the urgency of an integrated approach to planning. In fact, the Fourth Plan has marked a watershed in Indian Planning.

as for the first time certain steps towards balanced regional development have been taken. The National Institute of Community Development (Now N.I.R.D.) Hyderabad started work on integrated area development from 1970. S. Wanmali's[30] work on Regional Planning of Social facilities, brought out by Institute, is an endeavour to examine the applicability of central place theory in Indian environment. Bose[31] (1970) pointed out 'Institutional Bottlenecks' as the barrier in the development of backward areas in India.

In 1971, Wanmali[32] further illustrated the role of process of ranking of settlements in planning, practices. Later on, in the same year L.K.Sen and others[33] devised new strategy for integrated area development and prepared a project on the problem for planning of rural growth centres. The work taken as the case study of Miryalguda Taluka of Nalgonda district in Andhra Pradesh, could be accepted as a pioneering venture made by an interdisciplinary team of social scientists and research scholars. The contributions made by Burman[34] and Chandra Shekhar[35] on the aspect of integrated regional approach and the frame of balanced regional development respectively are worth mentioning. In 1972, Satyesh Chakraborthy[36] submitted some research objectives for rural area development and emphasized on the need of adoption of techniques relevant for integrated area development at micro-level. N.I.C.D.Hyderabad brought out the unique work of L.K.Sen[37] in 1972 to clarify the understanding of the spirit and purpose of regional planning for social facilities. A

case study of Karnal (Haryana) area has been taken by Das and Sarkar[38] with an objective to suggest a strategy for rural area development at micro-level.

In 1973, C.R.Pathak[39], appraised the strategies regarding the rural development with special consideration of the latest comprehensive area development programmes worked out by the West Bengal government. 'Pilot Project in Growth Centres' of Fourth Five Year Plan, was a centrally sponsored scheme consisting of 20 field cells. The holistic approach of the objectives of the project was concerned with the development of a methodology to contribute towards the villages of rural India with adequate access to the goods and services essential to social and economic development in the long run process of rising national productivity levels and equalising levels of social welfare[40]. Sen & Mishra (1974)[41] suggested a strategy for regional planning at micro-level for estimating the future need of electricity, for development of agriculture, industries and social facilities. The relevancy of functional and spatial organisation of human settlements for integrated area study was examined by Sharma and Bhat[42]. In 1975, Patel[43] contributed his views on conceptual and empirical aspects of integrated regional development at micro-level. He emphasized on economic fallacies of balanced regional development in Indian circumstances with special reference to tribal region of Madhya Pradesh. The study on 'Growth Centres in Raichur'

by L.K.Sen and others[44], based on location specific integrated area development may be acknowledged as first district plan. The study was an attempt to satisfy the criteria laid down by planning commission.

In 1976, N.I.U.D.Hyderabad contributed a number of works on integrated area development such as : 'Regional Planning for Hill Area[45], 'An Integrated Tribal Development Plan for Keonjhar district, Orissa[46], and 'Integrated Area Development Plan for West district Manipur[47]. L.S. Bhat and others[48] (1976) endeavoured to suggest a strategy for micro-level planning, taking a case study of Karnal area of Haryana. The work focusses on the conceptual and empirical aspects based on sound and simple statistical techniques. S.Mundle[49] and K.N.Kabra[50] presented a guide line for understanding the problem of micro-level integrated area development and planning. In the manual for Block Level Planning, Roy and Patil[51] suggested a new technique to investigate potential growth centres for investment and locating social facilities in Talala Block of Gujarat. Association of Voluntary Agencies for Rural Development[52] (A.V.A.R.D.) has designed an integrated area development programme of Bolpur block of West Bengal. In 1979, J.Singh[53] has attempted to take a comprehensive view and integrate the worthwhile elements of different concepts and approaches to development in Gorakhpur region. L.Singh[54] made some contribution in developing a methodology for micro-

level planning for bringing about integrated rural development suited to Indian conditions. In 1980, Singh & Pathak[55] presented a systematic account on concept and background of integrated area development Planning.

Finally, assessing the progress of work done on integrated area development in India, so far, it may be concluded that various research projects undertaken by different agencies are in progress. However, micro-level planning in close collaboration with sectoral planning require quite a lot of attention at each stage of administrative units from bottom to top and the criteria of diagnostic planning seems to be very helpful for overcoming the planning gaps. The present study, therefore, has been designed to select Karwi Tahsil a most underdeveloped part of district Banda, to testify the integrated area development strategy for a balanced regional development.

Research Design

OBJECTIVES

Although the study area is enriched with variety of natural resources, it is designated as most backward area of a backward district. The agriculture and industrial backwardness is responsible for a great deal of poverty, unemployment and deteriorating regional economy. The region has been suffering from negligence and discrimination particularly in providing developmental schemes and programmes. But after 1970, few infra.structural facilities such as drinking water, irrigation, electricity etc. were improved under a location specific micro-level plan during different plan periods.

The present study is,therefore, designed to prepare a locational plan with specific infra-structural network to fulfil the minimum needs of the each sector of rural community. One of the basic objectives of the present study is to determine the present and future sectoral needs and prepare perspective plans for economic and social upliftment. The specific objectives of the present study have been outlined ut infra.

(i) To evaluate the spatial pattern of settlements, population, economic activities, services and facilities and existing space relationship.

(ii) To appraise the levels of resource potentials and utilization.

(iii) To analyse the existing infrastructural network of the

area and to recommend an optimum infrastructural network for most profitable utilization of basic resources.

(iv) To identify the hierarchic order of central places and their hinterlands for appropriate location of specific investments.

(v) To assess the future requirements of education, health and other socio-economic facilities and to suggest suitable locations at different levels.

(vi) To provide a strategy for integrated area development with more emphasis on agricultural sector, as the whole economy is based on it.

(vii) To assess the potentialities of industrial development and to suggest new locations for industrial establishments, particularly based on local resources.

(viii) To identify the problems of weaker section of the society and to suggest the strategy for their socio-economic development keeping in view their habitat and culture.

(ix) To suggest the guide lines for the improvement of environmental quality and maintenance of ecological balance.

DATA BASE

The purpose of present study is to prepare the developmental plans for agriculture, industry, education, health etc.,

with spatial frame work of transportation in order to link central places and their hinterland at different levels in an integrated and comprehensive manner. These plans, however, can not be prepared in vacuum of data. The planning processes require certain reliable and relevant data in order to make definite statements about what and how can and should be done in each sector to attain the goal of integrated area development.

In order to comprehend the conditions and problems, the data from both primary and secondary sources have been collected. In the present study, secondary data have been widely used to analyse the physical and cultural background of the area. In case of population data, District Census Handbook of 1961 and 1971 and Provisional Population totals of 1981 have been made the base. The village level data for 1981 census are unpublished so far, therefore, these are obtained from different sources of census organisation. For the analysis of economic aspects, the data for three point of time i.e. 1970, 1975 and 1980 have been obtained from their respective sources. The general statistics and information regarding infrastructure are based on office record of different government departments as well as personal observation in the field.

The secondary data, as explained above, did not cover

the wide spectrum of the socio-economic problems of the study area. Consequently, primary data have been given due weightage. Primary data have been collected using a questionnaire (Appendix A). The questionnaire decides the distributional aspect and pattern of space preference for central functions which have been grouped under five major categories i.e. education, health, communication extension services, markets and other services. Respondents were selected among the literates and elite persons of the villages. Interviews of the villagers have also been conducted to identify the different type of problems.

METHODOLOGY

'The methodological considerations in geographical studies have changed from simple cartographic techniques to scientific or more quantitative approaches during the last two decades[56]. Exact derivation and more systematic handling of the problems related with development and planning justifies the use of such techniques, therefore, emphasis have been laid on recent quantitative techniques. The methodological frame of the study has been designed as under:-

Areal Units

In order to analyse the physical personality of the area such as geology, relief, drainage, climate and soil,

whole of the area has been considered as a unit. The same criteria has been followed to analyse the distributional pattern of economic activities and infrastructural net work. In general, revenue village (361) has been taken as a viable unit for the general analysis of different factors, however, for the comparative analysis and cartographic representation of the factors which are not feasible at village level, the Kanoongo circle (K. Circle), the higher order revenue collection unit, has been considered as meso level areal unit. These Kanoongo circles are the clusters of the villages grouped on the basis of equal revenue collection and thus, it may be considered as most viable unit for presenting the actual relationship between population and resources.

Cartographic Techniques

Map is one of the most important tool for a geographer for simplification of collected data, locating problems and testifying hypothesis. One inch and quarter inch topographical sheets, published by survey of India, have been used for analysing the relief features and drainage characteristics. The maps for existing cultural phenomena have been obtained from their respective agencies. These maps either used in original form or relevant facts have been extracted from them. The spatial characteristics and variability of various phenomena are represented by isopleth and choropleth techniques. The comparative and correlative expressions and their trends are shown by various suitable diagrams. Large number of

tables are avoided by applying the cartographic techniques.

In the present study, the conceptual frame work of the problem has been designed after having sifted the available literature in the forms of books, journals and project reports. Personal observations of the field have been considered as base, while describing the facts and figures. To find out the spatial characteristics of rural settlements, near neighbour analysis has been used. Lorenz Curves and location quotient techniques have geen applied to analyse the different population characteristics. Agricultural productivity has been calculated by using Kendall's ranking co-efficient method. Population threshold has been used to find out the hierarchy of different functions. Identification of central places is based on space preference, relative centrality and scalogram method. For identification of planning units, space preference and Reilly's law of retail gravitation have made the base. Co-efficient of correlation and regression equation have been obtained to assess the extent of relationship between different variables. The models and hypotheses developed on the theme of the integrated area development have been given due weightage in the present study.

Chapter Scheme

To facilitate the analysis, the study has been split up in seven chapters. The chapter first, dealing with introductory part of the study, consists of conceptual background

and chronological perspective on theme of 'Integrated Area Development', objectives, data base and research methodology adopted in the present study. It also includes the general as well as physical features of the region such as geology, relief, drainage, climate, soils, vegetation and wild lives.

The second chapter of the present study has been designed to analyse the various aspects of the settlement and population. Spatial analysis of settlements has been made to focus on the size, space and density, pattern of dispersion and types of settlements. While dealing with population pattern growth, density, decadal variation, sex composition, literacy, scheduled castespopulation and working and non-working population have been considered. These population characteristics have also been examined in relation to physical and cultural setting of the study area.

The third chapter is devoted to portray the spatial structure of the economy, based on agriculture, animal husbandry, mining, forestry and industry. As a base to agricultural economy of the area, the general and agricultural land use have been analysed. Similarly, cropping pattern, crop-combination regions, crop ranking and cropping intensity have also been identified and analysed. To assess the agricultural base of the economy, an attempt has been made to evaluate agricultural production and to decide the levels of agricultural development. Existing pattern of animal husbandry

has been identified describing the composition and distribution of live stock. The role of dairying, poultry farming, and fishery in economic base of the study area has been examined. The distribution and production of mineral and forest resources have been described under spatial and temporal frame. The distribution of industries and industrial employment have also been discussed to present industrial frame of the area under study.

The fourth chapter is concerned with spatial analysis of central places dealing with identification and determination of hierarchy of central places. The central functions, their clustering and hierarchy have also been discussed. To ensure the inter-central place movement, functional gaps between the centres of different orders have been identified. The spatial organization of central places has been presented as a conclusion of aforesaid study. The chapter fifth of the study presents an analytical account of the infra-structural pursuits contributing to present development. The functions like education, health, communication, electricity, market and agro-economic pursuits have been analysed in the view of spatial distribution, size of population group and existing problems.

The chapter sixth highlights the planning aspects of the present study. The study area has been divided into suitable planning units. The processes and approaches for area planning at different levels in India, have been dis-

cussed. The role of plans and programmes launched by government for the development of the area has been evaluated to point out the obstacles in the path of the area development. The future requirements of the increasing population have been projected. The guide lines regarding development of land, water, biotic, mineral and human resources have been formed. Planning measures have been suggested for development in industrial and agricultural sectors. More emphasis has been paid on new locations for industrial investment. To obtain the optimal socio-economic infra-structure for integrated area development, a number of new locations have been proposed. The proposals for education, health, communication, market, extension services finance and rural electrification have been forwarded. The motivation pattern for enhancing the process of development has been proposed. The infra-structural frame has been developed to improve the functional and spatial integration. The seventh chapter is confined to summary of conclusions and recommendations of the present research work.

The Study Area

Spatial patterns of earth surface are outcome of a complex interplay between physico-cultural factors which jointly fall under purview of environment. The influence of physical environment upon the nature and distribution of human activities, responsible for over all development of a region, is a matter of special significance in all geographical studies. Since the constituents of the physical environment viz. geology, relief, drainage, climate, soil and biotic life affect human activities, therefore, the study of these elements becomes inevitable for developmental work and planning.

LOCATION AND EXTENT

The study area, one of the five tahsils of Banda district of Uttar Pradesh is situated in the eastern part of Bundelkhand region. The area is bounded on the north by the river Yamuna forming an arc with the districts of Fatehpur and Allahabad and on the south by Satna and Rewa districts of Madhya Pradesh. The western limit of the study area is demarcated by the Baghain river and Baberu and Naraini tahsils of Banda district, while Mau tahsil forms the eastern boundary of the area.

Lying between parallels of $24^{\circ}53'$ and $25^{\circ}32'$N and meridians of $80^{\circ}41'$ and $81^{\circ}16'$E, it occupies the southern

position in the state of Uttar Pradesh. The tahsil covers an area of 2347.8 Sq.Km. which is 30.71% of the district as a whole. Accordingly, the total share of its population (342989 persons) is 22.30% of the district. The study area consists of 391 revenue villages. Including 3 inhabited forest villages, there are 361 inhabited villages in the area under study. The towns of Karwi administratively known as Chitrakoot Dham and Manikpur Sarhat (frequently referred to as Manikpur) form the urban landscape, comprising 0.44% of total area and 10.88% of the total population of the tahsil. Chitrakoot Dham municipal area consists of two separate settlement units i.e. Karwi and Chitrakoot with 8 kms inter-settlement distance. The historical town Chitrakoot Dham (Karwi) (Population 27454 persons) is blessed with the virtue of being development block, tahsil and Sub-division headquarters, comprising of Karwi and Mau tahsils. Recently, it has been declared as sub-district. The second urban centre Manikpur Sarhat (9882 persons) functions as a local market centre and development block headquarter.

ADMINISTRATIVE SET-UP

The name Karwi is perhaps derived from, 'Kamadgiri' the longer and more correct name of sacred hill of Chitrakoot situated about 8 kms to the south-west[57]. Karwi has traditions extending back to remote antiquity. Chitrakoot, the exile centre of Lord Ram and Bagrehi, the residence of great poet

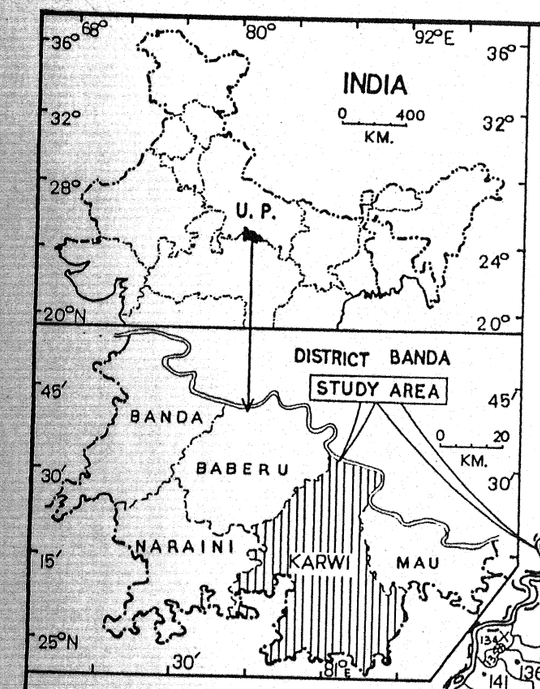
Valmiki, have remained the places of historical as well as religious importance since remote past. In early times the patha was inhabited entirely by tribes. In Chandel regime the people appear to have settled extensively in fertile soils of Karwi. The whole course of the Ohan river from Bahilpurwa to tahsil boundary is dotted with temple remains of Chandel origin. There are strong tradition that pargana was in the hand of Surki Rajputs who appears to have been intimately connected with Baghels.

The Bundelas fought several bloody fights in neighbourhood of Karwi. There are several Bundela remains at Purwa tarauhan, Kalyanpur, Bhaunri, Khoh and other places.

Karwi was a place of no importance till after the British occupation of Bundelkhand. In 1855, the British Government declared Karwi as sub-division head-quarter with the posting of Joint Magistrate Mr.Hogg[58] which has remained substantially unchanged to present day.

Karwi tahsil is divided into three development blocks which constitute lower order administrative units. These block viz. Chitrakoot, Pahari and Manikpur command over 180, 131 and 80 villages respectively. The study area comprises 34 Nyay Panchayats. For the purpose of revenue collection and administration the study area is divided into 7 Kanoongo circles viz. Karwi, Pahari, Parsaunja, Nandi, Bhaunri, Manikpur and Sardhua administered over 391 revenue villages (Appendix B and Fig. 1.2).

TAHSIL KARWI
ADMINISTRATIVE SET-UP



REFERENCES

BOUNDARIES — STATE — DISTRICT — TAHSIL — BLOCK — KANOONGO CIRCLE — VILLAGE — FOREST

HEADQUARTERS — TAHSIL — BLOCK — KANOONGO CIRCLE

VILLAGES — INHABITED — UNINHABITED

AREAS — URBAN — FORESTED

KILOMETERS
2 1 0 2 4 6

FIG. NO. 1.2

Chitrakoot Dham (Karwi) (25°13'N Lat. and 80°57'E Longitude) lies on Jhansi-Mirzapur road (State Highway No. 44). It is a railway station of Jhansi-Manikpur section of central Railway. The town (Class III) has developed as an administrative cum regional market centre. It is located on main east-west transportation route connecting it to Banda (70 kms) district headquarter and Allahabad (120 Kms). In the south via Chitrakoot it is linked by all weathered road to Satna (Madhya Pradesh). It is also linked with National capital Delhi (675 Kms), State capital Lucknow (285 Kms) and Kanpur (213 Kms) the main industrial centre of country by direct train route.

PHYSICAL FEATURES

In order to describe the regional structure well, it is worthwhile to outline briefly the physical features of study area, within the framework of its geographical surroundings.

Geology

Geology of a region is basic factor correlated with the spatially interwebbed phenomena of the earth surface. The rock should, therefore, be considered as the chief determinant of the physical landscape which intern shapes the socio-economic pattern of a region. A brief geological sequence of the area, based on geological studies made by

earlier geologists of the Geological Survey of India is shown in table 1.1.

Table 1.1 : Geological Succession

Age	Series (formation)	Stages (Members)
1. Recent	Recent Deposits	Alluvial deposits.
2. Upper Vindhyan System	(a) Residual Zone	i) Laterite.
		ii) Bauxite.
		iii) Lithomarge.
	(b) Rewah Series	i) Upper Rewah sandstone with conglomerate.
		ii) Jhiri Shales.
		iii) Lower Rewah Sandstone with Conglomerate.
		iv) Panna Shales.
		v) Paisuni (Sandstone) Rocks.
		vi) Sandstone and Quartzite Rocks
		vii) Red Sandstone, Conglomerate and Breccia.
	Unconformity	
	(c) Kaimur Series	i) Glauconitic Sandstone
		ii) Purple Calcareous Shales.
		iii) Conglomerate and Breccia.

Disconformity

3.	Lower Vindhyan System	(d) Semri Series	i) Lower Glauconitic, Sandstone and conglomerate.
			ii) Pallet Limestone.
			iii) Upper Glauconitic Sandstone.
			iv) Tirohan Limestome (Dolomite).
			v) Tirohan Breccia.

Unconformity

4.	Archaean System.	(e) Basic Igneous Intrusions	i) Meta Dolerite
			ii) Epidiorite and Hornblend schist.
			iii) Bundelkhand Granites, Gneiss, Schist.
			iv) Pegmatite and Quartz reef.

Main geological systems represented in the study are described as under. (Fig. 1.3A).

The Recent Deposits : The northern part of the study area is underlain by the alluvial deposits, which in north merge into the Gangetic alluvium. These deposites consist of fine to coarse sand, clay, Kankar and gravels in varying proportion and belong to Quarternary age. The alluvial sediments are of fluviatile and subaerial formations of sand, silt and clay. The texture of deposits becomes more and more refined as we proceed towards the river Yamuna from south central

KARWI TAHSIL

PHYSICAL FEATURES

Ⓐ

GEOLOGY

- ARCHAEAN SYSTEM
- SEMRI SERIES LOWER VINDHYAN
- KAIMUR SERIES] UPPER VINDHYAN
- REWAH SERIES]
- RECENT DEPOSITS

Ⓑ

RELIEF

PHYSIOGRAPHIC DIVISIONS

I RAVINE TRACT

II DISSECTED LOWLAND

III VINDHYAN TABLELAND

- ABOVE 1250 FEET
- 1000-1250 "
- 750-1000 "
- 500-750 "
- BELOW 500 "

Ⓒ

DRAINAGE

DRAINAGE BASINS

1 BAGHAIN BASIN

2 PAISUNI BASIN

3 BASIN OF SMALL NALAS

4 TONS BASIN

YAMUNA R.
BAGHAIN R.
PAISUNI R.
SAMBARI N.
GEDUWA N.
GAUHIA N.
CHAITA N.
CHAN
BARARA N.
KHANGAD R.
KARIBARAH N.
OHUBIA N.
JAVERI N.
BARDAHA N.

2 0 2 4 6 8
KILOMETERS

Ⓓ

DEPTH OF WATER TABLE

13.5M
10.5M
7.0M
7.0M
13.5M
10.5M
7.0M
7.0M
9.5M
10.5M
10.5M
9.5M

mca

FIG. NO. 1.3

granite country[59].

The Vindhyan System : This system is a vast stratified formation of sand stones, shales and limestones encompassing a thickness of over 4270 meters[60]. The Vindhyan system is composed of two distinct facies of deposits, one marine calcareous and argillaceous characteristically developed in the lower part, and the other almost exclusively arenaceous, of fluviatile or estuarine deposition, forming the upper portion. The sediments of Vindhyan system can be broadly grouped under two heads :-

(a) The Upper Vindhyan.

(b) The Lower Vindhyan.

(a) The Upper Vindhyan - Kaimur sandstones of upper Vindhyan age are found in the south of latitude 25°15' on greater part of Vindhyan plateau having considerable thickness. The most extensively developed rock type in the area is Kaimur sandstone which forms the famous Vindhyan scarps and the Kaimur Hills[62]. The sandstone is generally cream to dirty white in colour and is overlain by calcareous bed of 4'-5' thickness[63] which is consistently present in the area. This formation attains a thickness of about 165 meters in the Amusuiya gorge of the Paisuni river.

The Kaimur sandstone also caps many isolated hillocks of the granite in the northern alluvial plain. The depressions

are possibly the original clay nodules which have been subsequently weathered away. The sandstones are generally red to greyish white containing medium to fine grains. The Kaimur sandstone at deeper level are compact and highly impervious except at places where thin layer red fribble sandstone may occur at shallow depth such as near Khichari. The Rewah Series of Upper Vindhyan overlying on the silicified shales and greenish and white sandstone which occur about 10 kms south of Manikpur and occupy large tracts forming hillocks around Ranipur. At Ranipur, sandstones and shales are overlain by a thin cover of valley fill comprising clay and boulders along the Bardaha river.

Above Rewah series residual zone is extended over Deori, Rajhauhan, Donda, Matdar and Chulhi forest blocks. This zone is the storehouse of mineral resources i.e. bauxite, murram and ochre. The next overlying formation which consist of olive to purple colour shales, are sharply developed in upper Vindhyan. They are often carbonaceous and sometimes they are calcarious. This shale formation is overlain by glauconitic medium grained sandstone with varying thickness from 10 to 15 feet. This formation is observed along the Paisuni river. The above sequence is overlain by a prominent silicified breccia. This breccia is considered to be dividing the Kaimurs from the Rewah series. The major joints are of significance in the area as they often guide the course of streams and also sub surface water flow[64]. Upper Vindhyans were profusely intruded by lava dykes and sills.

(b) The Lower Vindhyan : The volcanic activity has played an important role in lower Vindhyan system. The southern hilly terrain of the study area locally known as Patha*, consists of the lower Vindhyan rocks. The area is chiefly represented by Tirohan limestone of the Semri series, expressed as narrow bends of outcrops along the scrap line passing south of latitude 25°15'N upto the river Ohan in the east. The thickness of Tirohan limestone has been observed to be 7.7 to 9.0 meters in the Kamtanath and Lakshman Pahar section[65]. Tirohan limestone (Dolomite) overlain unconsistently by Kaimur sandstone in the southern part of the plateau. This is a massive and tough rock, greyish or light pinkish in colour and well jointed in structure. The limestones exposed towards south-west of Karwi are highly curvaceous containing solution cavities of large size. Geophysical survey in Manikpur, Markundi and Karwi indicates that fractured limestones under saturated condition, are likely to be encountered within a depth range of 150 to 200 metres below ground level in plateau area. Sandwitched between the Tirohan limestone of lower Vindhyan and the Kaimur sandstone of upper Vindhyan there is an impersistently developed thin bed of breccia and conglomerate called Tirohan breccia. It contains pebbles of quartz, granite volcanic rocks etc., in a calcareous matrix.

---

* Patha area is a sharply defined upland of some continuous ranges and isolated hills of Vindhyan system.

The Archaean System

In this system, generally granite and gneiss are seen in which the former predominates. These are oldest rocks. The age of Bundelkhand granite is assigned 2300 million years[66]. The southern part of the study area is mainly rocky and is underlain by Bundelkhand granite. Its slope is towards north with the gradient of about two meters per kilometer. Bundelkhand granite outcrops are exposed in the west of Karwi in isolated patches. In the south west of Karwi, numerous hillocks of the basement granite occur which are occasionally caped with Lower Vindhyan rocks and Kaimur sandstone, such as Kamtanath hill. Bundelkhand granite consists of weathered granite cracks joints and fissures which are the main source of water in granitic country. The weathered zone of granite, exposed in lowlying area, is quite thick and at few places it is more than 3 meters. The exposed granitic rocks are quite compact, at the high altitude. The granite shows great heterogeneity in texture and composition. Texture is fine to very coarse, at places porphyritic and colour generally varies from grey to pink. The grey granite predominates over pink granite. The granites are composed essentially of quartz and feldspar with few ferro-magnesium minerals[67]. On weathering, the granite gives rise to a coarse residual material locally called murram.

Out crops of metadolerite and hornblende schists are

scanty in the area. In important outcrop of metadolerite is seen at the village Hariharpur with a thickness of 20 to 25 meters upto 0.5 Kilometer or even more in length.

Relief

Relief, the most important geographic factor, has also a great influence on spatial distribution of settlements, agricultural land use, transport sectors and few other variables effecting the process of regional development. It is, therefore, necessary to highlight the relief characteristics of the area.

The relief of the study area is the outcome of the deposits and rich formations of different periods varying in their lithologic, petrologic and stratigraphic positions. The role of denudation processes is dominant in their evolution and formation. Weathering action particularly physical and exfoliation are prominent in Bundelkhand granitic areas and to some extent in Vindhyan rocks, while chemical weathering has produced different microlevel land forms on Tirohan limestone belt. The agents of erosion, particularly running water are active in the study area and have produced meso and micro landforms both in alluvial zone and plateau area. With due consideration of relief features, the 750 feet (229 meters) contour may be taken as line separating two sharply defined areas. Divided by this contour, the southern portion may be termed as upland and northern portion

as dissected lowland, which reaches to the foot of the flat topped range of hills.

Moreover, according to general relief and landforms, three physiographic units can be identified distinctly in the area under study. (Fig. 1.3B).

1. The Yamuna Ravine Tract of the North.
2. Dissected Plain.
3. The Vindhyan Tableland.

The Yamuna Ravine tract of the North - The northern most region of ravine belt is about 2 to 3 Kms broad and is developed along main streams especially along their lower reaches near their confluence with the Yamuna. This is a narrow belt of bad land topography, dissected by innumerable gullies cutting into soft and erosive deposits.

Dissected Plain - Nearly 2/3 part of the study area is monotonously flat plain and stands in strong contrast with the Vindhyan table land which rises in three well marked contour of 500,750 and 1000 feet. The general slope of the plain decreases from south-west to north-east being 433 feet (132 meters) at Karwi and 342 feet (104 meters) at Rajapur[68]. This plain is a part of well defined region of Banda plain east[69]. It is marked by succession of narrow interfluves, formed by numerous deep channelled streams, draining the

Vindhyan table land to the Yamuna ravine belt in the north. The height of plain area is below 500 feet above sea level. The plain is dotted with some granitic hillocks e.g. the hillocks of Lodhwara (686 feet), Pahari(589 feet), Bhuinhari Muafi (395 feet) and Sainpur (528 Feet). Moreover, outlying rocky hills are generally of gneiss and syenite. Some of these hills are disintegrated into large masses by the weather and present a confused congeries of boulders while others are covered with trees and saved from axe by religious sanctity.

Vindhyan tableland - The southern part of the study area has an average elevation of 1000 feet (305 meters) above sea level and is bounded by Vindhyan spurs which form two ranges running from east to west. The northern and the southern ranges thus formed are termed as Bindhyachal and Panna ranges respectively. The Chitrakoot or Banda plateau locally known as 'Patha' is prolongation of Vindhyan hill ranges. The ascent from the plain to plateau is very sharp through an imposing escarpment termed as 'ari'. The scarps of Bindhyachal is formed by Kaimur sandstone while that of Panna Range is made of Rewa sandstone. Above the scarps the slopes are gentler and usually strewn with boulders.

The Chitrakoot Plateau is highly dissected upland incised by deep valleys of seasonal torrents. The Vindhyachal range does not exceed 500 feet (152 meters) above general

level of northern plain. The Panna Range forming the southern boundary of the region is above 500 feet (152 meters) above general level of the plateau that lies in between the two ranges. The southern boundary of study area runs usually along the 'ari' from which numerous streams flow down. Occasionally, below the 'ari' and between hills, valleys are found in which the growth of vegetation and trees are much more luxuriant than above.

The main geomorphic features of the tableland are Vindhyan spurs, escarpments, gorges and numerous rapids, cascades and falls.

Drainage

While describing physiography, drainage is an important factor due to its responsibility for the evolutional processes in relief and geology of the region[70]. The drainage system of the region has been divided as : Surface and sub-surface drainage.

Surface Drainage - Surface drainage of an area is controlled by the geological conditions, degree of slope, types of land-forms, soil and vegetation[71]. The drainage system of a region exhibits the natural plan of water system in that area. The scarps of Vindhyan plateau in the south determine the drainage system of the area under study. Functioning like a wall, it bifurcates the drainage system into north flowing (Yamuna

System) and east flowing (Tons System). The major part of the study area is drained by the Yamuna System.

The structure and relief exert their impact directly upon the drainage system. When the rivers flow in the southern upland their courses are mostly straight but in northern lowland they present many loops and bends. The courses of all streams are from south to north except of the Bagain which flows obliquely from south-west to north-east forming the north-west boundary of the study area. They have cut the country into well marked sections and intermediate watershed between them are well defined. Nearly all small streams are deep channelled torrents with abrupt banks, scored out by the force of flood water which subside as quickly as they rise and dry up completely after cold weather. This description applies in a modified form even to the larger streams.

The drainage system of the area consists of 4 river basins. (Fig. 1.3C). The study area is drained by the the following rivers and their tributaries.

The Yamuna

The Yamuna, the biggest stream of the area, first touches the frontier of the study area at village Akbaria from north-west direction. The southern bank of the river Yamuna, with the height of more than 15 meters does not permit its natural flow towards south. The river forms an

important loop at Surwal. The formation of good alluvial soil at Bira near mouth of Baghain and again at Bhadedu on that of Paisuni are noticed. It finally leaves the tahsil at village Chillirakas where the bank is generally lined with deep ravines. The bed of stream is sandy and silty.

The Baghain

The Baghain, next important right bank tributary of the Yamuna, touches the tahsil at village Pahari Buzurg Sani. Flowing from south-west to north-east it joins the river Yamuna at village Akbaria. This perennial stream rises from Kohrai hills near Kohari in Panna district. It forms comparatively little alluvial soil and often deposits quantities of sand or Kankar, being most capricious in its action, but near its function to the Yamuna it is liable to flood a large area of lowlying land. It has number of nalas which join it mostly from south-eastern part of the region. The Barua is main tributary of the Baghain.

The Paisuni

The main branch of the Paisuni river rises from Panna range in south of Pathar Kachar state near Majhgawan. The river touches the western boundary of village Itwa Dudaila forming the western boundary of the study area. It is joined by another arm which rises just south of the study area. At the village Mangawan, it falls from Vindhyan plateau in

two fine cascades separated by a deep pool, about 150 feet long. Near Ansuiya Pahar, it again enters in M.P. and flows as a picturesque mountain stream through a forested country. The discharge of the river Paisuni is 68.08 cusecs (July 1984 near Sati Ansuiya). It flows in a course almost parallel to Baghain in a curvilinear form with a minimum distance of 3 Kms between Patia Zapti and Kaheta Muafi village. The river joins the Yamuna at the village Kankota. Near its junction with the Yamuna, it forms some remarkable curves amidst lowlying land, mainly in the village of Bhadedu. Its banks are usually steep and bear the characteristics similar to those of river Baghain. At Bankat and Narainpur river passes through low rocky ridges.

The name Paisumi is derived from pai (milk) and sravini (flowing or falling). The local people assign the name Mandakini to what is generally called the Paisuni and the latter name to a deep broad 'nala' which flows from Simaria Jagannath Basi and joins the Paisuni at Sitapur[72]. The real name of nala is the Kuthar and it is only affluent of the Paisuni on its left bank. On the right bank the river is joined by non perennial rivers of Patha viz. the Sarbhanga, the Karibarar and the Hirakotra. But it has no tributary of importance even on this side for a distance of approximately 30 miles when it is joined by the Ohan.

The Ohan

The Ohan, a tributary of the Paisuni rises near the village Rukma and Dadri in the Patha proper, sometimes known as 'Dadar' Ka Patha'. Up to the village Simardaha the river flows in a shallow bed, strewn with boulders. Forming usual ravine land in the both side between steep bank, it joins the Paisuni at village Sagwara. It is a perennial stream and receives in its turn a number of tributaries among which the Gedua nala is most important.

The Bardaha

The Bardaha, the main river of the Tons System, rises in the high lands of Rewah plateau in the south-east of Karwi tahsil and enters in the study area near village Kulmar Parasin (uninhabited). During its short course in the study area, it passes through Karauhan, Rampur Kalyangarh, Uldam, Ranipur and leaves the area near village Maugurdari flowing eastward into Rewa again. In upper course, it flows down scouring the surface soil but in middle course, it flows over a gravely bed. The river forms notable fall at Bedhak above the village Nihi and at Abarkan and Dharkundi above Kalyanpur. It is the only river of Patha except upper reaches of Paisuni. Its deeper pools serve as the main source of drinking water in dry season. The main tributaries of this river are the Khangar, the Dhubiya, the Javeri etc. which are partly seasonal streams.

In addition to above large streams, there are small streams in a large number joining one or other these large streams. Among these the Gunta nala is noticeable. It rises in the village Kaubra and drains the village of Aghrahunda, Gahora Pahi, Gahorakhas, Dhan and Barhat. Flowing from south to north-east it enters in the tahsil of Mau at village Barhat.

The rivers flowing northward from Vindhyan ranges form parallel drainage pattern. In Patha area the Ohan and Bardaha rivers present a good example of dendritic pattern. Radial drainage pattern is marked in western and south central part, of the Patha area.

Sub Surface Drainage - All water existing in the voids or interstices of the soil and rock beneath the surface of the earth is called ground water or sub surface water[73]. It is important as a direct source of drinking water, irrigation and other public uses.

Water table and its Characteristics - Water table may be defined as a contact plane between free ground water and cappilary fringe. Water table which is a subdued replica of surface topography, reflects the quantity of ground water in storage.

The depth of water table in the area under study varies

from tract to tract due to variations in the lithology and relief features (Fig. 1.3D). Average water level depth below ground level in the Yamuna ravine belt is 14 meters which decreases upto 7 meters in interfluves in the plain. In the plateau area of the south, water table ranges from 7 to 13 meters below ground level, though the deeper water tables have also been recorded in some localized area. In the Ohan river catchment specially in Dadri and Rukma Khurd area, the water level in wells is maximum as it varies between 25-60 meters. In Ranipur area, the open wells, intaking the river flint of the Bardaha, possess moderate to large quantity of water around the year. The water level in the area varies between 5 to 10 meters below the ground level.

The seasonal fluctuation in the water table is remarkable in the area under study. Rainfall is one of the most important factor which causes replenishment in the groundwater storage and water table fluctuation. Water table fluctuations are also affected by evaporation up to some extent. Table 1.2 presents the monthly fluctuations in the depths of under ground water table from ground and water in the wells.

Climate

The importante of climate as a geographical control is well marked. It is the most influential geographical factor which has its direct effect through temperature, rainfall and humidity on agriculture and other economic activities. It

Table 1.2 : Depth of Water in the Wells

Month	Well at Karwi		Well at Manikpur		Well at Markundi	
	Depth of water Table from earth surface	Depth of water in well	Depth of water table from earth surface	Depth of water in well	Depth of water table from earth surface	Depth of water in well
January	8.44	4.17	2.68	6.77	7.52	3.25
February	8.65	3.97	2.70	6.78	8.73	3.83
March	9.98	3.97	2.76	6.69	10.02	2.58
April	9.49	3.12	3.29	6.15	11.42	1.48
May	9.66	2.95	3.50	5.73	12.06	0.50
June	8.95	3.66	3.22	6.07	12.03	1.00
July	8.00	4.62	3.07	6.37	10.13	2.90
August	7.25	5.36	2.73	6.72	4.01	7.96
September	4.68	7.93	2.81	6.64	4.30	10.26
October	4.91	7.69	3.10	6.51	4.14	9.84
November	5.28	7.34	2.91	6.44	5.55	8.68
December	5.55	7.05	4.03	6.41	7.10	7.93
Average	7.57	5.15	3.07	6.44	8.08	5.02

Source : Banda Forest division South, U.P. Action Plan Volume I 1974-75 - 1983-84.

also determines the working efficiency of the people and thus imposes a tremendous influence on regional economy. The study area falls under the domain of the monsoon climate. According to Koeppen the region falls cwg[74] which is characterised by dry winter. The climate of study area is mainly subtropical monsoon type in transition between those of north and south. The longitudinal extension of Vindhyans retards the force of south-west(Arabian Sea branch) mansoon current which, however, joining the Bay of Bengal mansoon winds causing rather heavy rainfall[75].

The sharp variations in climatic elements* like temperature, rainfall, humidity etc. usually divide the year into three seasons. (Table 1.3).

The Winter Season (November to February) - In winter season, the temperature shows downward trend as mean daily maximum temperature varies from 29.2°C in month of November to 27.9°C in month of February. December and January are considered coldest months of the season. The atmospheric pressure begins to intensify in the area after October due to south ward March of sun. The mean wind speed varies from 0.7 km/hour in November to 2.10 km/hour in February. During winters, dynamic subtropical type of anticyclone develops in the region, which weakens the depressions along the front of Northern India and provides a modest amount of winter rainfall. The amount of rainfall during winter fluctuates

*The climatic characteristics of the area have been analysed on the basis of data of Banda observatory. Karwi and Manikpur are the raingause stations of the area.

Table 1.3 : Climatic Elements.

Elements	Months												
	J	F	M	A	M	J	J	A	S	O	N	D	Annual mean
1. *Temperature													
Maxi. (°C)	22.7	27.9	34.1	39.6	43.0	40.9	34.0	32.1	33.1	32.8	29.2	25.2	32.88
Mini. (°C)	9.6	11.2	17.3	22.8	28.0	29.4	26.4	25.6	24.8	20.4	12.7	9.6	19.85
2. +Relative Humidity													
R.H. % I	76	62	48	36	35	54	83	83	80	69	61	73	63.33
II	57	41	31	23	35	44	76	82	74	59	49	58	52.41
3. +Rainfall (in mm)													
Karwi	14.5	18.3	6.3	6.3	7.9	82.5	325.1	336.0	183.1	37.3	8.4	7.1	86.07
Manikpur	15.7	18.5	6.6	2.3	6.6	81.8	323.9	334.8	169.7	30.0	7.6	6.1	83.63
4. *Mean wind speed (Km/Hour)	1.6	2.1	3.0	3.5	4.2	4.7	2.9	2.4	2.0	1.1	0.7	0.7	2.4
5. *Rainy days & Cloudiness/ Rainy days (No.)	2.5	1.1	1.1	0.3	0.5	4.1	13.5	14.7	8.7	2.8	0.2	0.4	49.9
Cloud Cover (Octas of Sky)	2.3	1.0	1.2	1.0	0.8	2.7	5.1	5.4	3.2	1.4	0.6	1.1	21.1

Source - + Indian Meteorological Department, New Delhi Year 1970-71.

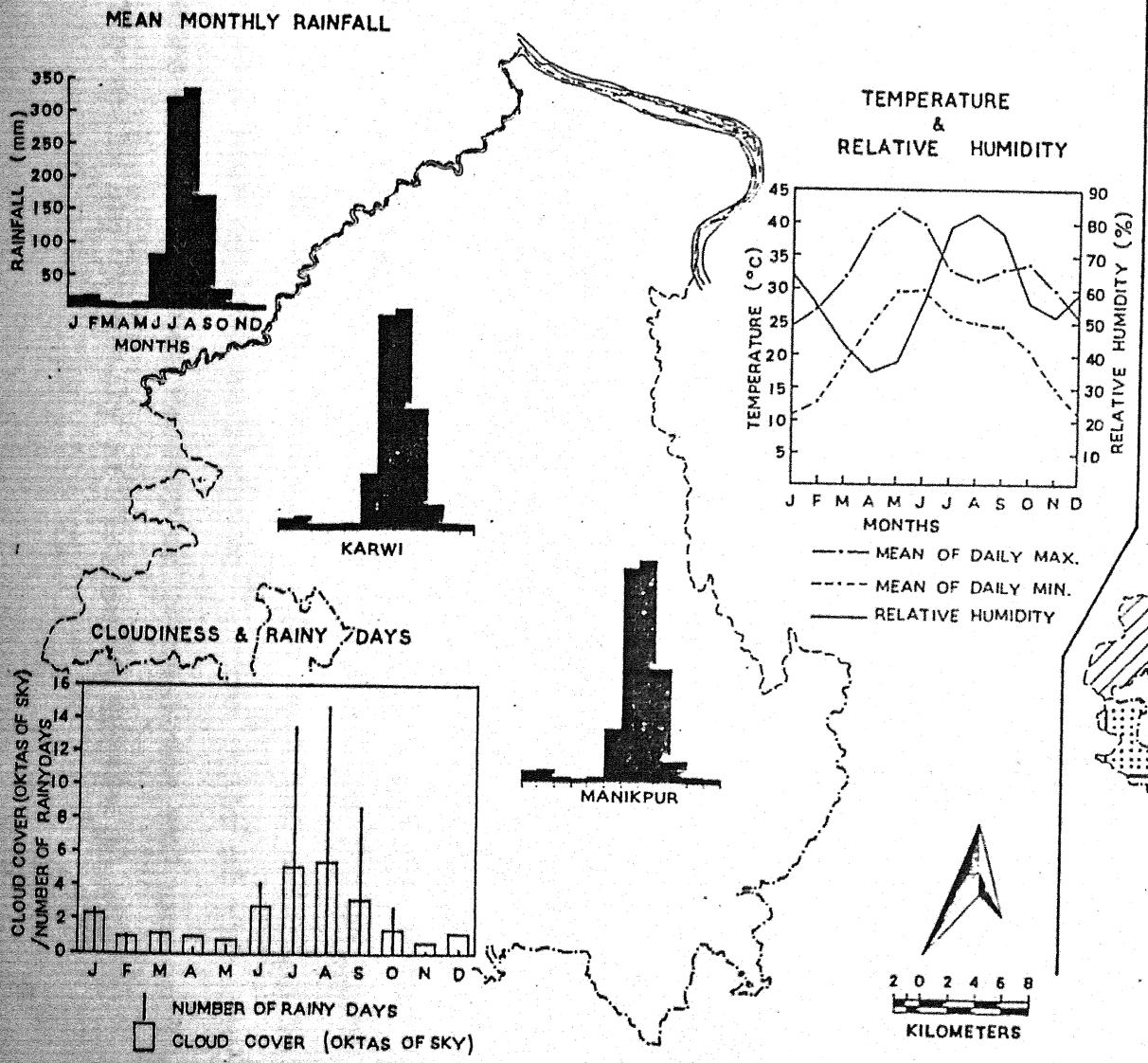
* Agricultural Bulletin of Uttar Pradesh 1977.

between 8.4 mm in November and 18.3 mm in February with lowest amount received in December at Karwi station. At Manikpur station rainfall is lowest in December (6.1 mm) and highest in February (18.5 mm) during the season. Moderate humidity (50-70%) and almost cloudless sky except in the month of January is observed in winter season. (Fig 1.4A). Nights are frequently chilly and frost occur during sweeping of cold waves.

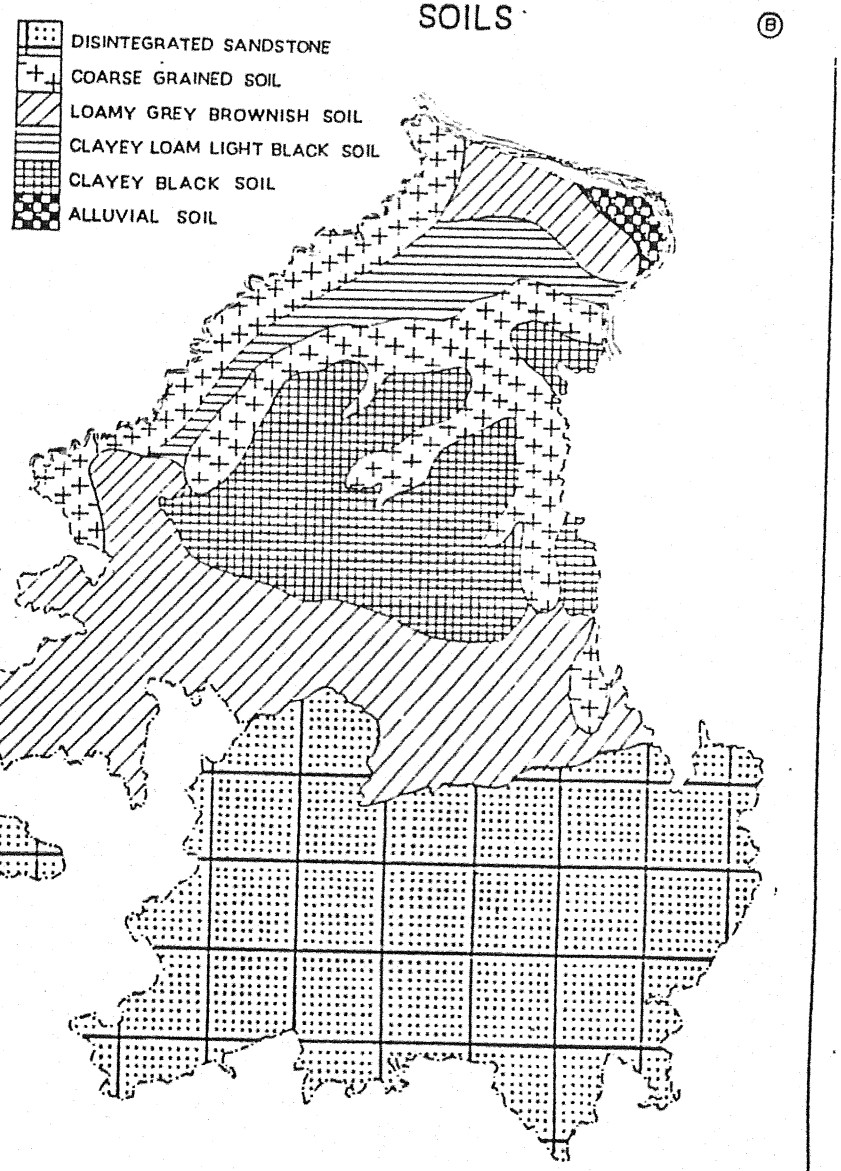
The Summer Season (March to June)- The temperature shows upward trend from January onward. In March the mean of daily maximum is recorded 34.1°C and it reaches 43.0°C in the hottest month of May. The study area often registers the largest number of sun strokes every year probably owing to intensive terrestrial radiation and lack of haziness in the sky. The hot dry westerly winds blow in the month of March (3.0 km/hour). The speedy winds blow in the Month of May and June with average speed of 4.2 km/hour and 4.7 km/hour respectively and are known as 'Loo'. These winds originate due to convective air movements, produced by treating of earth surface and rapid decrease of temperature. Occasionally, it blows at the terrible speed of 60 to 100 km/hour with enormous cloud and it termed as 'Andhi' (Storms). Local storms often gives the region, one or two pre- monsoon shower followed by lighting and hail and cause damage to the harvest in March-April. Humidity varies from 30 to 50%

TAHSIL KARWI

Ⓐ CLIMATIC CHARACTERISTICS



Ⓑ SOILS



mco

FIG. NO. 1.4

during the season. The highest cloud cover and rainy days are observed in the month of June.

The Rainy Season (July to October) - The rainy season commences with the last fortnight of June. It is marked by the arrival of the summer monsoon which withdraws in the last week of October with retreat of monsoon. With the commencement of the season, regional temperature falls abruptly. July and August are the months of maximum rains characterised with muggy and shultry weather conditions. Amout 80% of the total rainfall is concentrated in three months but monthly budget is highly variable. The uncertainty of rainfall is responsible for large number of famines and scarcities prevailing in the study area since past. Since it follows summer season, temperatures are usually high and vary between 34°C and 32°C. The highest percentage of humidity (82.5), maximum number of rainy days (14.7) as well as highest cloud cover (5.4 Oktas of sky) are recorded in the month of August.

Soils

Soil is the chief support of agriculture and forestry. For all agricultural operations and planning the accurate knowledge of soil is essential. The detailed soil map is stable base of landuse planning[76]. The soils of the study area exhibit a great variety of composition and appearance. The soils are generally of shallow to medium depths

and are underlined by partially or undecomposed and undis-integrated parental material.

Detailed survey of the soils of 379 villages of Karwi tahsil has been done by the department of Agriculture of U.P. Government. This work was confined only to the stage of morphological examination of surface, subsurface and the sub-soil. Under this survey the soil of each individual village was examined from a number of sites[77]. On the basis of fertility of soil and intensity of irrigation, the soil of the region have been classified under four classes[78] namely; (1) Mar soils, (ii) Kabar soils, (iii) Parwa soils and (iv) Rankar soils. Roy Chaudhary[79] has grouped Bundel-khand soils on the basis of their morphological characteristics into two main broad divisions i.e. black soils and red soils. The soils of the study area can be classified[80] under the following major groups based on texture, colour, composition, drainage and level of land (Fig. 1.4B).

(1) Disintegrated sandstone.
(2) Coarse grained soil.
(3) Loamy grey-brownish soil.
(4) Clayey-Loam light black soil.
(5) Clayey black soil.
(6) Alluvial soil.

1. <u>Disintegrated Sandstone (Bhonta)</u>[81] - It occurs in the

upland on Vindhyan Plateau. The soil consists of a thin layer of crumbled sandstone above the solid rocks. The soil is mixed with stones and is greyish or reddish in colour. It is deprived of clay particles, highly porous and poor in humus and other plants nutrients. Depth of the deposit is entirely responsible for fertility. Usually Millet is sown under kharif crop.

2. Coarse grained soil (Rankar) - Rankar means 'stony', but it is applied to all the soil in which larger Kankar nodules are conspicuous. It is usually found on the edge of ravines or on slopy ground and the presence of Kankar is due to washing away the surface soil. It is commonly divided into 'moti' and 'patli', the former being deteriorated mar or kabar and the later, being excoriated light soil. The soil is less moisture retentive and deficient in organic matter and nitrogen. This low grade soil can permit only the coarse kharif crops viz. Jowar, til and bajra.

3. Loamy grey-brownish soil (Parua or Domat) - Parua is a light coloured sandy soil, admixture of clay and sometimes of sandy loam. The soil occupies the areas with gentle slope or in well drained plains with sufficiently recognised depth. In the texture, the soils are fine loam to sandy loam with varying colour of light brown to grey. Chemically, it is poor in iron, lime, phosphate and nitrogen.

These soils are not rich in organic matters but their good structure is responsible hence it is highly fecund and suitable for wheat cultivation. Over irrigation is harmful on acc unt of highly alkali content.

4. Clayey loam light black soil (Kabar) - The origin of Kabar ascribed to the sub aqueous disintegration of Deccan Trap. It is highly diffused soil and is similar to mar in many ways. There are two varieties of Kabar soil viz. (1) pure dark variety similar to mar and (ii) the light black variety. The latter is admixture of mar and parua. The chief characteristics are extreme adhesiveness which makes it quickly dry and turn into hard blocks. It is still tenacious soil with a large percentage of clay and deficiency of sand. It is highly moisture retentive and absence of lime nodules separates it from mar. Generally superior form of Kabar is fine clay, tinged with organic matter. The soil is highly fertile, rich in alumina, ferric oxide, lime, magnesia and organic matter and suitable for gram, jowar and cotton cultivation.

5. Clayey black soil (Mar) - The soil is similar in origin with Kabar and generally occurs in gently lowlying surfaces. It is deep clay to clay loam in texture and calcarious soil, predominantly blackish in colour mixed with small lumps of Kankar and iron nodules. It is often called cotton black

soil, usually supposed to be derived from disintegration of trap rocks varying in colour, consistence and fertility. These are very fecund under good management but even a slight diversion from the agricultural time scheduled renders them almost unploughable because soil gets either too dry or too wet for tillage operation. It is highly prized soil for the cultivation of wheat, gram and sugarcane.

6. Alluvial Soil - The alluvial soil, also termed as riverine soil, is composed of fragments, brought out by transporting agencies which vary in their characteristics from coarse sand to fine clay. There are two recognized varieties of alluvial soils i.e. Kachhar and Tari. Tari practically means all land that is liable to fertilising deposits from the river. The soils are highly fertile due to receipt of fresh silt from annual floods and generally used for producing water melons and vegetables. Kachhar on the other hand, is land lying higher up the shelving banks with slope down to the water. For the settlement purpose, these soils are sub-divided into two class viz 'Goind' and 'Kachhwara'.

Orai experimental farm and Jawahar Lal Nehru Agricultural University, Jabalpur have made significant contribution to the soil science of Bundelkhand and general characteristics of the soil have been concluded as follows[82].

(i) All the soils are poor in organic matter varying from

2.53 to 6.08%.

(ii) Mar and Kabar are generally uniform in their chemical composition.

(iii) Rankar is very much poor in phosphorous sulphuric and carbonic acids, hence less fertile.

(iv) Magnesia, potash and soda are more or less uniform in all the soils.

Soil Erosion and Conservation - Soil is the most indispensable gift of nature for cultivation. But since the down time it has been on the move. Rain and wind both have been even busy to transfer it from place to place[83]. Erosion is considered as the detachment and transportation of the soil. It is a serious problem in the study area, due to its undulating topography, high velocity of streams, unconsolidated soils, lack of vegetal cover in plain area, faulty cultivation practices and indiscriminate grazing. In the area under study mainly erosion by water is more active. Consequently, a large part of land became unfavourable for agriculture.

The soil erosion can be checked by afforestation, contour bunding, control of grazing and terraced cultivation. Government machinery is very active in this regard and soil conservation measures are being practiced in the study area (Table 1.4).

Table 1.4 : Executed Area Under Soil Conservation.

Year	Detail of executed area (in Hect.)						
	Contour Bund	Level-ling	Water Harve-sting	Gully Plugg-ing	Submer-gence Fund	On Farm Develo-pment	Total Achie-vement
1979-80	6.50	-	81.86	2956.23	68.50	159.65	3274.74
1980-81	32.00	-	34.00	3289.00	228.50	179.00	3762.50
1981-82	30.00	13.20	-	2796.21	22.50	28.20	2890.11

Source - Office of the B.S.A. Atarra at Karwi.

Vegetation

The vegetation of an area absolutely depends on physiographic, climate and edaphic conditions. Tropical dry deciduous and mixed deciduous types of forests are extended in the study area because of low rainfall and thin soil cover. In upland part, the forests are dense along river valleys while plateau and hillocks passes the sparse growth but in plain area the origin vegetal cover has been removed. The vegetation of the study area may be divided into three categories viz. forests, scrubs and grasses and groves. Main plant species grown in the region are enlisted in Appendix C.

Forests - The forest of the study area are administered under forest division Banda and cover 58641.22 hectare land specially on the southern upland. Teak, one of the most significant trees

is found only in small patches. Karghai forests usually occur on gneiss hills. Other important species are Sej, Dhawa, Salai, Khair, Ghont, Gurja-gabdi, Thuhar etc. Besides, Mahua, Sal, Achar and Bamboo are also found.

Scrubs and Grasses - The scrubs are found abundantly in ravine tract and low waste land. The rugged topography allows the growth of Babul, Karaunda, Kareel, Khair, Ingota and Sahjana. The Chul or Dhak profusely grows especially on Kabar soil. In patha extensive area is under grasses. The grass around Markundi is of best quality. On the waste land, particularly on light soil the Jharbery grows profusely. The grasses are used for grazing, fodder and little for rope making.

Groves - Fenced groves of the doab type are limited only on the light soil, however, plantations of trees are found in some villages and mainly consist of Mahua. Mango trees are unsuited for area, though some specimen are found around Karwi. Among the other species planted along the roads and in clumps for fuel and building material are Neem, Shisham, Jammu, Semar, Pipal etc.

Wild Life - Wild life plays an important role in maintaining the ecological system of an area. Although several species of wild animals have been perished with the development of civilization yet a considerable number of species are still in existence. For the conservation of wild animals a wild life park has been developed in the study area named as 'Ranipur Pashu Vihar'.

Among primates, the monkey and Langoor are very common. The common antelopes (Antelope cervircapa) called 'hiran' or 'mrig' are found in the Chauri, Kalyanpur and Chulhi forest blocks while four horned antelope is common in the Dadari forest block near the Paisuni river and Katra forest block. The Mamania, Ranipur, Uldan, Deori, Rajauhan and Kalyanpur blocks of Manikpur range and Chauri Dadari and Donda blocks of Markundi range are the natural habitat of lion (Panthera Tegris) and Guldar Locally called as 'Tendua'. According to wild life census 1982, there were 9 lions and 6 guldars in Manikpur and Markundi forest ranges[84]. Besides, sloth, bear in Ranipur, Mamania, Kalyanpur and Chauri blocks and 'sawar' in Garhchapa, Dadari, Chauri and Kota Kandaila blocks are commonly found.

..

REFERENCES

1. Singh, R.N. and Pathak, R.K. (1980) : 'Integrated Area Development Planning Concept and Background', National Geographer, Vol. XV, No.2, p. 157.

2. Draft Fourth Five Year Plan (1969-74) : New Delhi Planning Commission, pp.229-230.

3. Jain, N.G. (1979) : 'Integrated Rural Development. A Geographical Approach' in Recent Trends and Concepts in Geography (Ed.) Mandal R.B., and Sinha, V.N.P. (1980) Vol.III, New Delhi, p.214.

4. Mishra, R.P. (1976) : Regional Development Planning in India - A New Strategy, Delhi, p.40.

5. Mishra, R.P. and Sunderam, K.V. (eds) (1980) : Multi level Planning and Integrated Rural Development in India, New Delhi, p. 20.

6. Sharma, S.K. and Malhotra, S.L. (1977) : Integrated Rural Development: Approach Strategy and Perspective, Cited by Singh, R.N. and Pathak, R.K. (1980), op. cit., p. 158.

7. Sen, L.K. et al. (1971) : Planning Rural Growth Centres for Integrated Area Development: A case study of Miryalguda Taluka, N.I.C.D. Hyderabad, p. 2.

8. Sharma, R.C. (1980) : 'A Conceptual, Chronological and Attributive Treatment to the Approach of Integrated Area Development', Indian Journal of Regional Science, Vol. XII, No. 2, p.158.

9. Sen, L.K. et al. (1975) : Growth Centres in Raichur: An Integrated Area Development Plan for a District in Karnatak, N.I.C.D. Hyderabad, p.3.

10. Ibid, p.4.

11. Sharma, R.C. (1980) : Op. cit., p. 159.

12. Patel, A.R. (1984) : 'Rural Development: Experience is the best Teacher', Kurukshetra, Vol. 32, No.4, pp. 19-24.

13. Roy, Prodipto and Patil, B.R.(1977) : Manual For Block Level Planning Delhi, p. 86.

14. Pathak, C.R.(1973) : 'Integrated Area Development : A Study for Rural Agricultural Development' Geographical Review of India, Vol. 35, No.3, pp.222-231.

15. Singh, R.N. and Pathak, R.K.(1980) : Op. cit., p. 161.

16. Idem

17. Prakasha Rao, V.L.S. (1963) : Regional Planning, Theoretical Approach, Calcutta, p.2.

18. Shah, G.L. (1979) : 'Spatial Organisation of Rural Settlement in Mountainous Part of U.P. - A case study in Integrated Area Development' Symposium on Geographers & Regional Planning (Abstract) University of Gorakhpur, p. B.9.

19. Draft Fifth Five Year Plan (1974-79) : 'Planning Commission, New Delhi.

20. Bosch, H.(1952) : 'Central Function as a Basis for Systematic Grouping of Localities'. 'International Geographic Union', 17th - Abstract of Papers, The National Geog. Soc. Washington,p.7.

21. Sharma, R.C.(1980) : Op. cit, p. 160.

22. Anderson, N.(1963) : 'Aspects of Rural and Urban', Sociological Buralis, Vol.3, pp.8-22.

23. Shastry,M.V.R.(1965) : 'Integration of National and Regional Economic Models in the United States.' The Indian Economic Journal, Vol.16, No. 1, p.44.

24. Market Towns and Spatial Planning : N.C.A.E.R. India (1965), New Delhi,p.4.

25. Thompson,I.B.(1966) : 'Some Problems of Regional Planning in Predominantly Rural Environment. The French Experience in Corsica'. Scottish Geog. Magazine, Vol. 85, pp. 119-29.

26. Hilling, J.B.(1968) : 'Mid-Wales : A Plan for the Regional', Journal of the Town Planning Institute, Vol. 54, pp. 70-74.

27. Andrade,C.P. and Roy, P.(1969) : 'Preliminary Reports on Pilot Projects for Integrated Area Development': Ford Foundation and Council for Social Development, New Delhi.

28. Clout, H.D.(1969) : 'Planning Studies in Rural Areas Integrated Planning in the Country Side' ~~in Trends in Geography in the Country Side~~' in Trends in Geography (Ed.) Cooke, Ronald and Johnson,J.H., pp. 228-130.

29. Skinner, C.W.(1969) : 'Marketing and Social Structure in China, 'Journal of Asian Studies, Vol. 24, No. 1, p. 33.

30. Wanmali,S.(1970) : Regional Planning for Social Facilities - An Examination of Central Place Concepts and their Application. A Case Study of Eastern Maharashtra, N.I.C.D. Hyderabad.

31. Bose, A.N.(1970) : 'Institutional Bottlenecks. The Main Barrier to the Development of Backward Areas, Indian Journal of Regional Science, Vol. 2, No. 1, p. 45.

32. Wanmali, S.(1971) : 'Ranking of Settlements : A suggestion', Journal Behavioural Sciences and Community Development, Vol.5, No.2, pp. 97-111.

33. Sen, L.K. et al. (1971) : loc. cit.

34. Burman, Roy, B.K.(1972) : 'Towards An Integrated Regional Frame: Economic and Social-Cultural Dimensions of Regionalization'. Census of India, Monograph No.7, New Delhi, pp. 27-50.

35. Chandrashekhar,C.S. : 'Balanced Regional Development and Regions' Census of India, Monograph No.7,New Delhi, pp. 59-74.

36. Chakrabarthy, S.C.(1972): 'Some Considerations of Research Objectives for Rural Area Development.' Indian Journal of Regional Science, Vol. 4, No.1 pp. 6-11.

37. Sen, L.K. (ed.)(1972) : Readings on Micro-level Planning and Rural Growth Centres', N.I.C.D.Hyderabad.

38. Das, B.N. and Sarkar, A.K. (1972) : 'Rural Area Development-Karnal Area, A case Study'. Indian Journal of Regional Science, Vol. 4, No.2, pp. 164-179.

39. Pathak, O.R.(1973) : Op. cit., pp. 222-231.

40. Sharma, R.C. (1980) : Op. cit., p. 163.

41. Sen, L.K. and Mishra, G.K. (1974) : Regional Planning for Rural Electrification: A case Study of Suryapet Taluk, Nalgonda District, Andhra Pradesh, NICD, Hyderabad.

42. Bhat, L.S. and Sharma, A.N. (1974) : 'Functional Spatial Organization of Human Settlement for Integrated Area Study', 13th Indian Econometric Conference, Ahmedabad.

43. Patel, M.L. (1975) : Dilema of Balanced Development in India,Bhopal, pp.33-34.

44. Sen, L.K. et al.(1975) : loc. cit.

45. Sen, L.K. and Thaha, A.L. (1976) : 'Regional Planning for Hill Areas : A Case Study of Pauri Garhwal District',Hyderabad.

46. Patnaik, N. and Bose, S.(1976) : 'An Integrated Tribal Development Plan for Keonjhar District, Orissa', Hyderabad.

47. Khan, W. and Ramesh, K.S.(1976) : 'Integrated Area Development Plan for West District Manipur, Hyderabad.

48. Bhat, L.S, et al.(1976) : Micro Level Planning : A case Study of Karnal Area, Haryana, India, New Delhi.

49. Mundle, S.(1977) : District Planning in India, I.I.P.A. New Delhi.

50. Kabra, K.N. (1977) : Planning Processes in a district, I.I.P.A. New Delhi.

51. Roy, P. and Patil B.R. (1977) : loc. cit.

52. Integrated Development Programme of Bolpur Block, West Bengal : Association of Voluntary Agencies for Rural Development, New Delhi.

53. Singh, J.(1979) : 'Central Places and Spatial Organization in a Backward Economy: Gorakhpur Region, A study in Integrated Regional Development', Gorakhpur.

54. Singh, L.(1979) : 'Integrated Rural Development: A Case Study of Patna District.' (Bihar), National Geographer, Vol. 14, No.2, pp. 193-203.

55. Singh, R.N. and Pathak, R.K. (1980) : Op. cit, pp. 157-171.

56. Singh,S. and Chauhan, V.S.(1984) : Regionalisation for Rural Development and Planning, Meerut, p.16.

57. Brockman, D.L.Drake (1920) : A District Gazetteer Banda, Vol. XXI, p.257.

58. Idem.

59. Singh, R.L.(1971) : India, A Regional Geography, Varanasi, p. 599.

60. Wadia, D.N. (1975) : Geology of India, New Delhi, p.121.

61. Idem.

62. Sinha, K.K.(1970-71) (Geologist) : A Report on Systematic Geohydrological Studies in Part of Banda District U.P. and Satna District, M.P. (Unpublished Report Field Season), G.S.I., Lucknow.

63. Swaroop, P. and Shrivastava,S.C.(1968) : 'Progress Report on the Bauxite Deposits Discovered in the Rajauhan Forest Block, Banda District, U.P.,' Unpublished Report G.S.I.,Lucknow, p.3.

64. Sinha, K.K. (1970-71) : loc. cit.

65. Bhatnagar, N.C. and Shah, D.L. (1966-67) : 'On the Possibilities of Ground Water Development in the hard rock and Adjacent Alluvial Area in Part of Banda District (U.P.)' (Unpublished Report) G.S.I. Lucknow, p.4.

66. Dubey, V.S. (1960) : 'Igneous Activities and Periods of Orogenesis in Gondwana land', Presidential Address to the Section of Geology and Geography Indian Science Congress Association Bombay, cited by Singh, R.L. (1971), op.cit, p.599.

67. Siddique, M.A. (1974-75) : 'Geological and Geomorphological Studies in Ken River Basin in Part of Banda District U.P.', G.S.I., Lucknow.

68. Siddique, M.F. (1966) : 'Physiographic Divisions of Bundelkhand'. The Geographer, Vol.XIII, p.28.

69. Singh, R.L. (1971) : Op. cit, p.618.

70. Singh, H.P. (1979) : Resource Appraisal and Planning in India, New Delhi, p.20.

71. Rao, M.S.V. (1962) : Soil Conservation in India, New Delhi, p.219.

72. Brockman, D.L. Drake (1920) : Op, cit., p.17.

73. Shrivastava, R.C. (1967) : Water Resource and Their Utilization in Saryu Par Plain of Uttar Pradesh (Unpublished Thesis Gorakhpur University), p. 138.

74. Spate, O.H.K. and Learmonth, A.T.A. (1967) : India and Pakistan : Land People and Economy, London, p.68.

75. Kendrew, W.G. (1953) : The Climates of the Continents, London, p.169.

76. Roy, Chaudhary, S.P. (1966) : Land and Soil, New Delhi, p.5.

77. Mehrotra, C.L. and Gangwar, B.R. (1970) : Soil Survey and Soil Work in Uttar Pradesh, Vol.II, p.73.

78. Brockman, D.L.Drake (1909) : District Gazetteer Jalaun Vol. XXX, p.5.

79. Roy, Chaudhary, S.P. and Others (1969) : Soils of India, Indian Council of Agricultural Research, New Delhi, p.332.

80. Chaudhary, L.K.S. (1972) : 'Land Utilization of Ken Tons Doab of Uttar Pradesh' in Symposium on Land Use in Developing Countries, 21st International Geographical Congress, Aligarh, p. 122.

81. Local Names of Soils are given in parenthesis.

82. Singh, H.P. (1979) : Op. cit., pp. 32-33.

83. A Mannual on Conservation of Soil and Water, United States, Department of Agriculture, New Delhi, 1964, p.1.

84. Assistant Wild Life Conservator, Ranipur Pashu Vihar, Karwi, Banda.

..

CHAPTER - II

SETTLEMENT AND POPULATION PATTERN

Man, as the cultural asset of settlements, is the creator, originator and fashioner of settlement units and hence he represents reciprocal relationship of human settlement forms, features and environment with a certain economic condition and need based requirement. The changing pattern of human behaviour and spatial location invariably alters the relative position of settlements. Since each phase of development is oriented to human welfare, the study of man (population) and units of their agglemeration (Settlements) forms a great relevance in the context of regional development and planning.

Settlement Pattern

The settlement is a system of complex organisation with man and his occupance units, constituting the two component of the system. These are the most distinctive form of cultural landscape. The rural settlements in their crudest form are the initial expression of man's interaction and interference with nature's attributes. Every settlement has its own distinctiveness which varies from region to region in its pattern as well as morphology.

The study area in all, has 363 inhabited settlements including only two urban settlements i.e. Chitrakoot Dham and Manikpur Sarhat. The inter-relation between rural

settlements (361) and their distributional pattern which helps in spatial planning, has been analysed with the help of different quantitative methods. For the purpose of the analysis, K. circle has considered as a viable areal unit.

The distribution of rural settlements presents a correlation between physical personality and socio-economic conditions prevailing in the area. The northern plain has allowed more regular distribution of settlements than those of the southern rugged terrian locally known as 'Patha'. The regularity of settlements is disturbed by various factors, such as lithology, relief, availability of water, land-use, means of transport, communication and socio-economic organization. Fig. 2.1 A shows the concentration of rural settlements in the study area.

SIZE OF SETTLEMENTS

The size of settlement is much influenced by economic productivity of its surroundings which may properly be called a hinter-land of the settlement [2]. Size (area and population) is an important factor affecting the density and distribution of rural settlements. Generally large size village (at a given density of population) increases the spacing but lower downs the density of villages in a region. Table 2.1 presents the size of settlements of the study area.

Table 2.1 : Size of Settlements

Population size					Areal size				
Population groups (Persons)	Inhabited villages		Rural Population		Areal Groups (Acres)	Total villages		Total Rural area	
	No.	%	Total	%		No.	%	Area (Acres)	%
Below 200	57	15.78	5827	1.90	Below 500	118	29.94	34567	6.57
200-499	86	23.82	31321	10.24	500-1000	124	31.47	88782	10.90
500-999	116	32.13	85043	27.82	1000-2000	86	21.83	121458	23.11
1000-1999	70	19.40	94083	30.78	2000-3500	34	8.63	86142	16.39
2000-4999	31	8.59	84405	27.62	3500 & above	32	8.13	194619	37.03
5000 & above	1	0.28	5004	1.64	-	-	-	-	-
Total	361	100	305653	100		394	100	525568	100

TAHSIL KARWI
SIZE OF RURAL SETTLEMENTS
1981

CONCENTRATION OF RURAL SETTLEMENTS

Ⓐ

0 4 8 12 16
KILOMETERS

LOCATION COEFFICIENT
1.5 ->
1-1.5
< 1

Ⓑ

81°E 15′

30′

15′

25°N

AREAL SIZE (ACRES)
3500 & ABOVE
2000 — 3500
1000 — 2000
500 — 1000
<500

POPULATION SIZE
5000 & ABOVE
2000-4999
1000-1999
500 - 999
200 - 499
<200
X UNINHABITED

F-1
F-2
F-3
URBAN

2 0 2 4 6
KILOMETERS

Ⓒ
CUMULATIVE % OF POPULATION
0 20 40 60 80 100
CUMULATIVE % OF SETTLEMENTS

Ⓓ
% OF POPULATION, SETTLEMENTS & AREA
0 10 20 30 40
AREA
POPULATION
SETTLEMENTS
SARDHUA PARSAUNJA PAHARI NANDI KARWI BHAUNRI MANIKPUR

Ⓔ
CUMULATIVE % OF SETTLEMENTS
0 20 40 60 80 100
CUMULATIVE % OF AREA

RELATIONSHIP BETWEEN POPULATION, AREA & RURAL SETTLEMENTS

145′

mca

FIG. NO. 2.1

Population Size

The average population size of the villages in the study area is 847 persons in comparison to district's village size 1272 persons. Out of 361 rural settlements, 39.6% settlements fall under the group of small size (below 500) villages sharing 12.14% of rural population. Medium size group (500-1999 persons) covers more than half villages (51.53%) and 58.6% of rural population while large size villages group (2000 to 4999 persons) comprises of only 8.59% villages and 27.62% of total rural population, Bhaunri (5004 persons) is only single large village of the study area having 1.64% to total rural population. The study reveals that large size villages are the common features of the southern upland and dissected ravine land of the north while small and medium size villages are dotted in the plain and agriculturally productive areas (Fig. 2.1B).

Areal Size

The average areal size of villages in the study area is 133 acres which is higher than the district village size. The area size study of villages reveals that 60.91% of villages fall under small size areal group ($<$ 1000 acres) comprising 23.47% of total rural area. Medium size villages (1000-2000 acres) are extended over 23.11% rural area consisting of 21.83% villages. Very large size villages of areal size more than 2000 acres cover only 16.76% of total

revenue villages and contain 3.42% area. The areal size of the villages is generally governed by topographic features. Lorenz curves have been used to measure the inequality in the distribution of rural settlements in relation to rural population and the area. This geographic method has a merit to show the line of equal distribution in relation to actual distribution. The deviation of any curve from the line of equal distribution is proportion to level of inequality in the distribution of one attributes in relation to other. Fig. 2.1C reveals that there is a perfect corelation between curves of settlements and population distribution and line of equal distribution. The distributional pattern of settlements in relation to area shows a trend of concentration. The curve shows that 82.55% settlements are distributed over 63.12% of rural area (Fig. 2.1E). The relationship between settlements, area and population has been depicted cartographically (Fig. 2.1D).

DENSITY AND SPACING

Density of settlements is closely related with the spacing and size of the settlements. The spacing of the settlements has intimate bearing upon environmental factors e.g. low spacing of settlements is observed in the plain agricultural land while high spacing may be seen in the upland, ravine land and relatively less fertile area.

The calculation of spacing of settlements was first taken by Barnes and Robinson[3]. The following formula derived by Mather[4] has been used to compute the spacing of settlements.

$$D = 1.0746\sqrt{A/N}$$

Where D = Average distance of settlement to its six nearest neighbours.

A = Total area of the study unit.

N = No. of settlements in the study unit.

On the basis of equation 'ut supra', computation of inter village distance for seven K. circles has been made. Similarly, settlement density for each K. circle has been calculated. The average inter-village distance and density of Karwi tahsil as obtained is 2.60 Kms. and 17 settlements/ 100 Km^2 respectively. On the basis of spacing and density, three distinctive groups of K. Circles have been obtained (Fig. 2.2A).

1. <u>Low Spacing (< 0.2 Kms) and High Density (>125 Settlements/100 Km^2)</u>

The group consists of two K. circles of Nandi and Karwi comprising 34.35% of total villages. Fertile agricultural land and availability of water are the factors contributing to such type of distributional pattern of settlements.

2. Moderate Spacing (2.0-3.0 Kms) and Medium Density (15-25 Settlements/100 Km^2.

This group includes four K. Circles namely Parsaunja, Sardhua, Bhaunri, and Pahari having 48.20% of total settlements. The area is characterised by ravine land, under developed means of transport and comparatively less fertile land.

3. High Spacing (>3.0 Kms) and Low Density (<15 Settlements/100 Km^2)

Manikpur Circle, extended over 17.45% villages of the study area comprises the group. It is the tract of hilly upland, extensive forest cover and under developed means of transport.

PATTERN OF DISPERSION

Dispersion may be defined as the degree of deviation of a set of points from random relative to some delimited area. An attempt has been made to measure the degree of dispersion by using the method known as 'Nearest Neighbour Distance Approximation Analysis'. This method has the assumption that points are randomly distributed in accordance with a Poisson Probability function, where each location has equal chance of containing a point. But in real world, settlements are neither evenly nor randomly spaced. The complete randomness is the mid point of the continuum of

TAHSIL KARWI

CHARACTERISTICS OF RURAL SETTLEMENTS

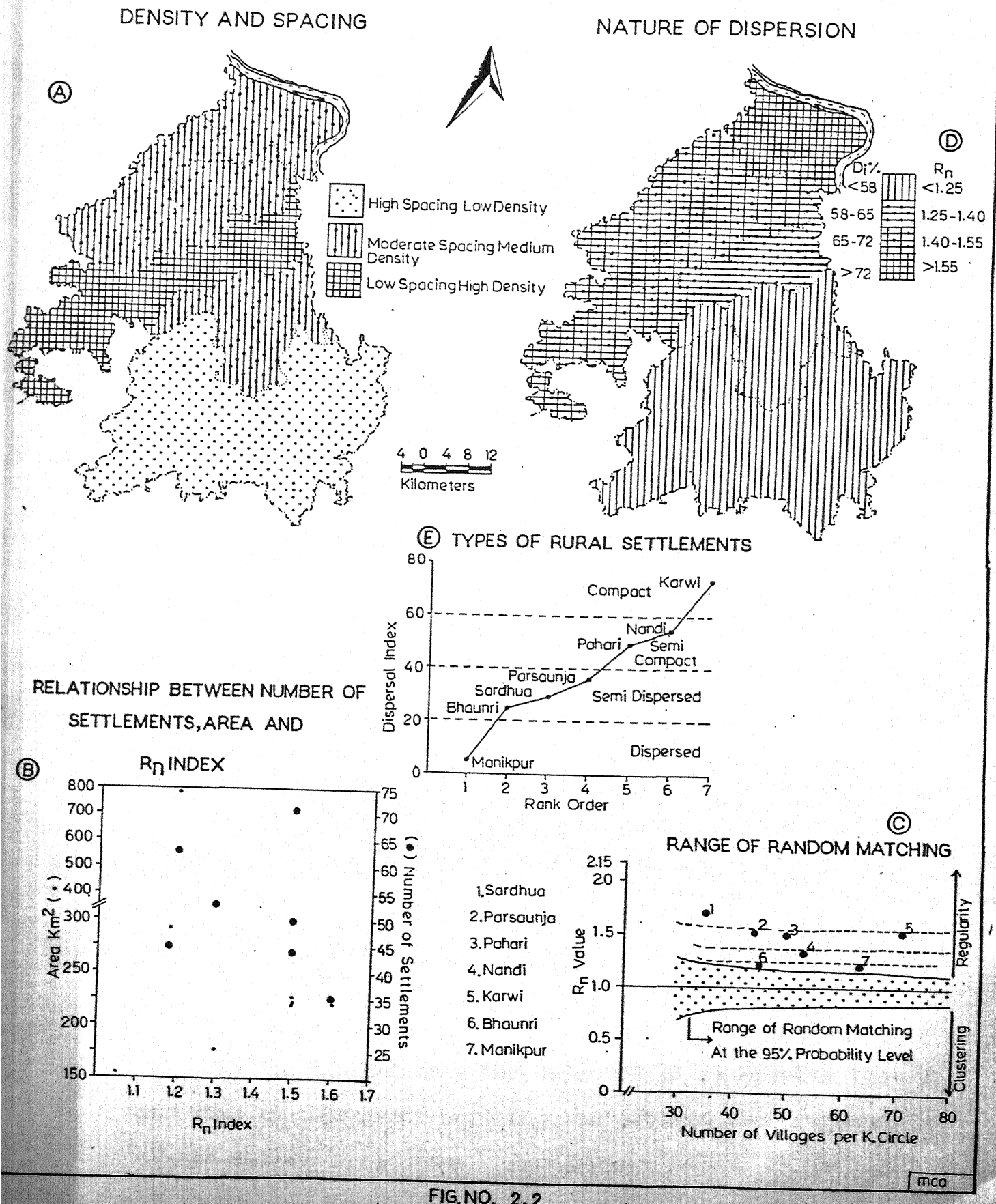


FIG. NO. 2.2

saptial pattern extending from complete clustering to complete uniformity.

The index of randomness 'Near Neighbour Index (Rn)' has been calculated using the formula developed by Plant ecologist Clark and Evans[5].

$$Rn = \frac{rO}{rE} \text{ and } \quad rE = 1/\ (2\sqrt{d}\ )$$

Where rO = Observed mean of nearest inter village straight line distance.

rE = mean expected distance of random distribution.

d = Village density.

The Rn statistics provide a measure of degree to which the distributional pattern of the observed inter village distance deviates from random expectations. The relationship between Rn Index, Area and Number of settlements has been depicted cartographically (Fig. 2.2B). This index can be correlated with variance (V) for further testing. The variance has been calculated by a mathematical equation[6].

$$V = (4 - \pi) / 4 d \pi$$

If rE > V the distribution is termed as regular.

rE < V the distribution is termed as clustered.

rE = V the distribution is termed as random.

In the present case the value of rE is greater than V and thus it represents more regular pattern than random (Table 2.2).

The test of significance of rE has been made about the hypothesis of randomness on the basis of standard error (σrE)[7] which is given as -

$$\sigma rE = 0.26136/(nd)^{\frac{1}{2}}$$

d = density of villages per Km^2

Similarly, another index of test i.e. statistics of standard variate of normal curve (c) has been calculated by the following formula[8].

$$C = (rO - rE)/\sigma rE$$

The upper and lower ranges of random matching at the 90% probability level have been also delimited with the help of formula -

$$(2\sigma rE \pm rE)/ rE$$

Fig. 2.2C exhibits that there is no occurrence in the range of random matching as such it also represents more regular pattern than random. The width of range of randomness is not affected by area. If the number of points (villages) is large the range of randomness is small and vice versa.

Table 2.2 : Nature of Dispersion of Rural Settlements

	rO	rE	Rn	rE	V	C	Di
1. Sardhua	2.100	1.265	1.660	0.112	0.437	7.500	0.772
2. Parsaunja	1.727	1.135	1.528	0.089	0.353	6.7078	0.707
3. Pahari	1.490	0.990	1.505	0.073	0.269	6.8492	0.666
4. Nandi	1.240	0.915	1.362	0.065	0.230	5.0768	0.629
5. Karwi	1.341	0.875	1.540	0.054	0.210	8.7036	0.711
6. Bhaunri	1.500	1.270	1.181	0.099	0.442	2.3232	0.548
7. Manikpur	2.190	1.766	1.244	0.116	0.851	3.7068	0.576
8. Karwi Tahsil	1.608	1.210	1.329	0.033	0.401	12.06	0.618

After measuring the degree of deviation from random expectations the intensity of random disturbance (Normalised Index[9]) has been taken out by using the formula -

$$Di = \frac{rO}{D} \times 100$$

Where rO = observed mean nearest inter village straight line distance.

$D = 1.0746\sqrt{a/n}$

a = area of the unit

n = number of the settlements in the unit.

Table 2.2 shows the results of different indices computed in reference to the nearest neighbour analysis. The dispersion pattern of the villages may be classed into four categories on the basis of Rn and Di indices (Fig.2.2D).

(1) Least Regularity - (Rn $<$ 0.25 and Di $<$ 58%)

It covers the area of 1080.15 Km^2 (50.75%) and 108 settlements of Bhaunri and Manikpur circles comprising the southern part of the study area. The standard variable of normal curve is $<$ 4.0. The region is characterised by rocky and dissected terrain, water scarcity, extensive forest cover, unproductive land and underdeveloped means of communication.

(2) Low Regularity - (Rn 1.25 - 1.40 and Di 58 - 65%)

Nandi circle exhibits the pattern of low regularity extended over 178.47 Km^2 (8.39%) area of north-eastern part of the study region having 53 settlements. The standard variate of normal curve is 5.0768. The factors contributing to the pattern of low regularity are lack of irrigational facilities, less productive land and under developed means of communication.

(3) Moderate Regularity - (Rn 1.40 - 1.55 and Di 65-72%)

The pattern of moderate regularity is observed in 3 K. Circles i.e. Pahari, Parsaunja and Karwi occupying an area of 643.82 Km^2 (30.3%) and 165 settlements.

(4) Moderately High Regularity - (Rn $>$ 1.55 and Di $>$ 72%).

Lying over Sardhua circle of the study region it covers an area of 224.46 Km^2 (10.56%) and 35 settlements. The settlements in the area are situated along the river

banks on high altitude and form a linear pattern of distribution.

The study reveals that the trend of dispersion is always towards regularity, so Dacey's "Regular Poisson Probability Law"[10] is appropriate in this case because the empirical variance-mean ratio is always smaller than 1, and mean is always more than variance. This can also be evidenced by the intensity of random disturbance which is always less than 1.

TYPES OF SETTLEMENTS

The regional distribution of particular settlement type is based on dispersal index. The word "Type" used here indicates the relationship between settlements within organised space[11] which provides a distinctive view of the spatial organization. To identify the settlement type, dispersal index has been calculated by using the following formula[12].

$$\text{Dispersal Index} = \frac{\text{Total Rural Population of K.Circle} \times \text{No.of villages in K. Circle}}{(\text{Total Rural Area})^2}$$

After considering the dispersal Index thus obtained, four types of rural settlements i.e. compact, semi compact, semi dispersed and dispersed have been decided (Fig. 2.2E).

Population Pattern

The nature and man are jointly responsible for the developmental changes to the regional economy. The human resource can be expressed as a factor of prime importance in the economic development of a region. In an underdeveloped area like the study area, with large size of population, the significance of effective man power planning and optimum development of human resource need not be emphasized. Hence, to attain the real goal of integrated area development planning, the analysis of population pattern of the area under study is inevitable. Here, an endeavour has been made to analyse the population growth, decadal variation, density, sex composition, literacy, scheduled castes population and occupational structure of the population.

POPULATION GROWTH

Growth of population is an important aspect of demographic study through which an impact of other resources can be realised, which have been either deterrent or incentive to population growth[13]. Perhaps no other attribute of population in an area contribute to its demographic dynamism, as does growth of its population. Population growth of an area is an index of its economic development, social awakening, cultural background, historical events and political ideology[14].

Table 2.3 reveals that during last eight decades (1901-1981) the total population of Karwi tahsil has grown from 78410 to 342989 recording an increase of 337.43%[15]. The straight line equation* $Y = 4.3 + 0.32x$ represents the trend of population growth during last 80 years (Fig. 2.3A). The growth of population during corresponding period in Banda District was 758.69% which was comparatively higher. During the same period growth in urban and rural population was recorded 289.60% and 344.07% respectively. The rate of annual growth of total population remained 1.57% while annual growth rate of rural and urban population were noted 1.58% and 1.48% respectively.

The decade (1901-11) showed an increase in population by 8.09%. During the period, region suffered from famine of 1907-08 which affected growth up to a considerable extent. Severe droughts and epidemics during 1911-21 resulted 1.50% decreased in the population. The serious famine of 1913, influenza and black fever epidemics of 1918 and 1920 took a heavy toll of lives. In the decade of 1921-31, the accelerated increase in population (66.43%) was recorded which was much higher than the growth of the district 2.06% during the same period. The favourable factors for the rapid growth of population were the exploitation of forest resource and development in agricultural sector. In 1931-41 decade, the population of the region increased moderately

---

* The trend of population growth is calculated by straight line equation i.e. Y=a+b, where 'a' indicates mean population and 'b' indicates the growth gradient.

Table 2.3 : Population Growth (1901-81).

Census year	Total Population	Population Growth %	Rural Population	Population Growth %	Urban Population	Population Growth %	Exponential Population
1901	78410	-	68829	-	9581	-	78410
1911	84759	+ 8.09	74766	+ 8.62	9993	+ 4.30	94296
1921	83488	- 1.50	73609	- 1.54	9879	- 1.14	113400
1931	138951	+66.43	128632	+42.77	10319	+ 4.45	136375
1941	177585	+27.80	165005	+28.27	12580	+21.91	164004
1951	182093	+ 2.53	169138	+ 2.50	12995	+ 2.98	197231
1961	217854	+19.64	197226	+16.60	20628	+59.22	237190
1971	261788	+20.16	237482	+20.41	24306	+17.83	285245
1981	342989	+31.02	305653	+28.70	37336	+53.60	343036

at the rate of 27.80% which was higher than that of the district growth (18.20%).

The period (1941-51) is marked with slight increase of population. In this decade political disturbance, floods and endemic began to lessen the population year to year. The epidemic of cholera in the summer months of 1950 gave a set back to its demographic dynamism[16]. Since 1961 upto 1981, the growth rate accelerated to marked increase of 19.64%, 20.16% and 31.02% respectively. The factors responsible for the growth under the said period were illiteracy, decrease in mortality due to increasing health facilities, and increase in birth rate due to least consciousness with family planning programmes.

The growth of urban population is faster than that of the rural population (Fig. 2.3A). The maximum difference between growth of urban and rural population is noted in decades of 1921-31 and 1951-61. In 1921-31, the rural population grew up with faster pace leaving behind urban population at the rate of 42.77% and 4.45% respectively. In decade of 1951-61, the urban population growth (59.22%) is much higher in comparison to rural population growth (16.60%). This increase in the urban population is due to emersion of one more town in the urban landscape of the study area. High growth in urban population exhibits

the increasing trend of urbanization during 1971-81 decade.

DENSITY

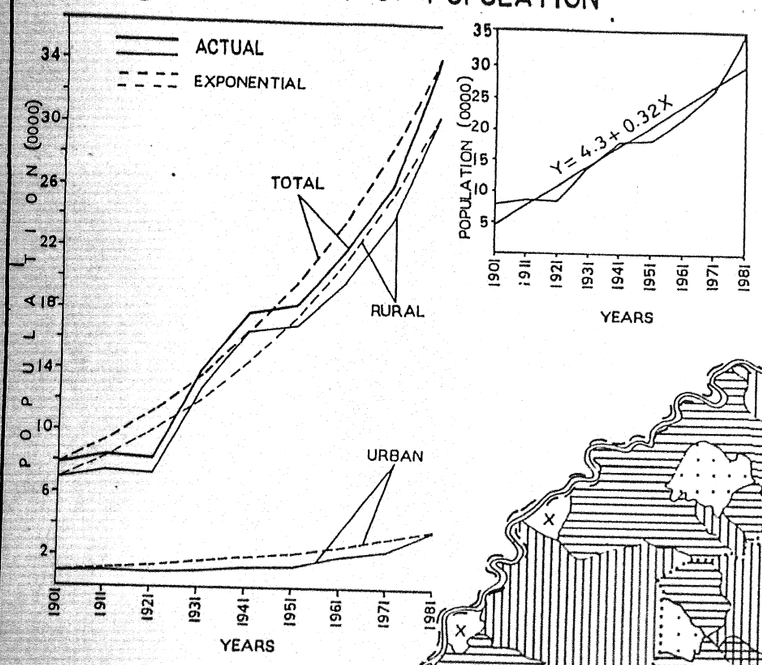
Land and people constitute the two important elements of an area, the ratio between the two is, therefore, of fundamental consideration in all population studies. The distributional aspect of population is inseparable from that of population density, which serves as a quantitative tool for assessing the degree of population concentration[17]. The study of population should, therefore, be complemented by a discussion on the pattern of population density to adjudge the distributional pattern of population more comprehensively. For a better understanding of population resource relationship, the concept of density of population has been given various expressions. The differentially calculated man-land ratios have been designated as arithmetical density physiological density, nutritional density, caloric density, economic density etc. With a view to have a comparative knowledge, all above mentioned densities have been calculated and discussed as below (Table 2.4).

Arithmetic Density - Arithmetic density provides the most superficial representation of the real pressure of population[18]. Arithmetic density of the tahsil for 1981 is 161 persons/Km^2 which is lesser than that of Banda district (202 persons/Km^2). The low density is the result of lower agricultural base,

TAHSIL KARWI

ARITHMETICAL DENSITY Ⓑ
1981

Ⓐ GROWTH OF POPULATION



PERSONS/KM²
- BELOW 100
- 100–199
- 200–299
- 300–399
- 400 & ABOVE
- FOREST
- UNINHABITED
- URBAN

F-1
F-2
F-3

25°N
2 0 2 4 6
KILOMETERS

81°E
45′
15′
30′

mca

FIG. NO. 2.3

Partially developed irrigational facilities, slow speed of industrialization and urbanization combined with harsh-dry climate, rugged and undulating topography. Chitrakoot Dham and Manikpur Sarhat are only two urban centres presenting very high urban density.

Table 2.4 : Density of Population (1981) (Persons/Km^2)

K.Circles	Arithmetic density	Physiological density	Nutritional density	Caloric density	Economic density
Sardhua	187	221	226	238	250
Parsaunja	188	215	220	236	249
Pahari	196	219	226	236	253
Nandi	185	211	217	348	255
Karwi	228	317	338	226	384
Bhaunri	165	276	309	317	343
Manikpur	64	235	298	312	360
Total Rural	143	241	260	273	296
Urban	3590	-	-	-	-
Karwi Tahsil	161	271	292	306	332

To present the distributional pattern of population in the area under study, the spatial analysis of arithmetic density has been made on the village level and five classes of density distribution have been observed (Fig. 2.3B).

Generally, the areas of low to very low density are situated in the southern part of the study area characterised with dissected rocky terrain, water deficiency, undeveloped means of transport and under developed agricultural base. Besides, few patches of low to very low density are located in the areas of unproductive soils and deficient irrigational facilities. The high to very high density, covering 45.04% villages is observed in the central plain which is agriculturally productive and comparatively accessible areas. Areas of medium density (100-199) usually fill up the gap created due to both extremities of physico-cultural factors affecting distribution of population and are extended over north and north-eastern part of the study area.

The distributional pattern of density on K.Circle level shows that Manikpur and Karwi circles form the lower and upper limits respectively. It is obvious that five circles constitute the group of moderate density.

Physiological Density

The physiological density is a ratio between total population and total cultivated area and is expressed in terms of number of persons per Km^2 of cultivated area. Indicating the actual pressure of population on cultivated land, it is one of thesuitable technique to study the land-man relationship.

The average physiological density of the region is 271 persons/Km^2. The variation in density is apparent with a change in population and cultivated area. The village level analysis reveals that 34.35% villages fall in the low to very low density (below 200) group. The same percentage is shared by the villages constituting the group of high to very high density (above 300). The highest density is observed in Karwi circle representing the high population pressure on cultivated land. The low density figures are recorded in Nandi, Pahari and Parsaunja circles.

Nutritional Density

The nutritional density is more refined techniques for calculating man land ratio. It is expressed as the ratio of total rural population to total cropped area.

The average nutritional density of tahsil Karwi is 292 persons/Km^2. The considerable variations in the distribution of nutritional density both on village and K. Circle level are well marked. 37.43% villages are characterised with high to very high (above 375) density while low to very low (below 225) density groups comprise 37.98% villages. The study at K. Circle level reveals that Karwi circle followed by Bhaunri represents the high nutritional density (above 300). The low density (below 250) is observed in Sardhua, Pahari, Parsaunja and Nandi circles indicating low pressure of population on total cropped area.

Caloric Density

The man-land ratio in term of total rural population and total area under food crops is known as caloric density. It is an effective measure and a micro refined index of man-land relationship in agrarian economy.

The average caloric density of the area is 306 persons/ Km^2. The analysis of distributional pattern concludes that 34.63% villages indicate low to very low level (below 225) of caloric density while high to very high level (above 300) is reflected in 41.35% villages. The moderate density is observed in 24.02% villages indicating moderate pressure of population on food cropped area. Table 2.4 presents the distribution of caloric density on K. Circle level.

Economic Density

The Economic density of population of an area is conceived as the ratio between total rural population and total economic area. In the present study according to availability of data, net area sown has been considered as economic area.

The average economic density of the study area is 332 persons/Km^2. The village Level analysis shows that 50% villages exhibit the low level (below 300) density while high level density is observed in 27.65% villages. Karwi and Manikpur circles present the high economic density.

DECADE VARIATION

The study of population variation becomes a real flash when we prepare a plan in terms of population growth, resource need and projections on micro level. As planning processes have to the tasks as the organs of community life, therefore, wide range of variation in the rate of population growth is the most cordinal feature of the population dynamics. Hence, the study of variation in the rate of population growth is inevitable in view of the problems of regional development and social changes.

In the decade of 1971-81, 31.01% of variation in the total population has been recorded which is higher than population variation of Banda district (30.09%) and the State of Uttar Pradesh (25.49%). The variation in the female population (31.65%) is slightly higher than that of the male population (30.46) representing the slight change in the socio-economic conditions of the females. A comparative analysis of variation in rural and urban population reveals that variation in urban population (53.60%) is about two times greater than the rural population (28.70%) indicating the increasing trend of urbanization. Similarly, the variation in female population is higher than male in both urban and rural areas.

To present a spatial analysis of decade variation, village level computation has been made and five groups of

variation of population have been obtained. (Fig. 2.4A). The areas of low to very low variation (below 20%) are extended over 24.93% of villages representing the unfavourable physico-cultural conditions of population growth while the high to very high variation comprising 26.59% of villages reveals the sound condition pertaining to population growth. Medium variation group consisting of 48.48% villages commands the distributional pattern.

To present a spatio-temporal pattern of decade-variation, two consecutive decades (1961-71 and 1971-81) have been taken in to consideration (Table 2.5 & Fig. 2.4B).

POPULATION BREAK-UP

Under the head of population break-up, three main characteristics of population viz., sex-composition, literacy and scheduled castes population have been considered and their role in the regional development has been studied.

Sex Composition

The sex ratio is the function only of the sex ratio of births and deaths or the influx into and the efflux from population[19]. As the role of sex-ratio decides the socio-economic set up of an area, it serves as a useful tool for the regional development. It has a controlling effect on different demographic attributes such as growth of population marriage rate, occupational structure etc.

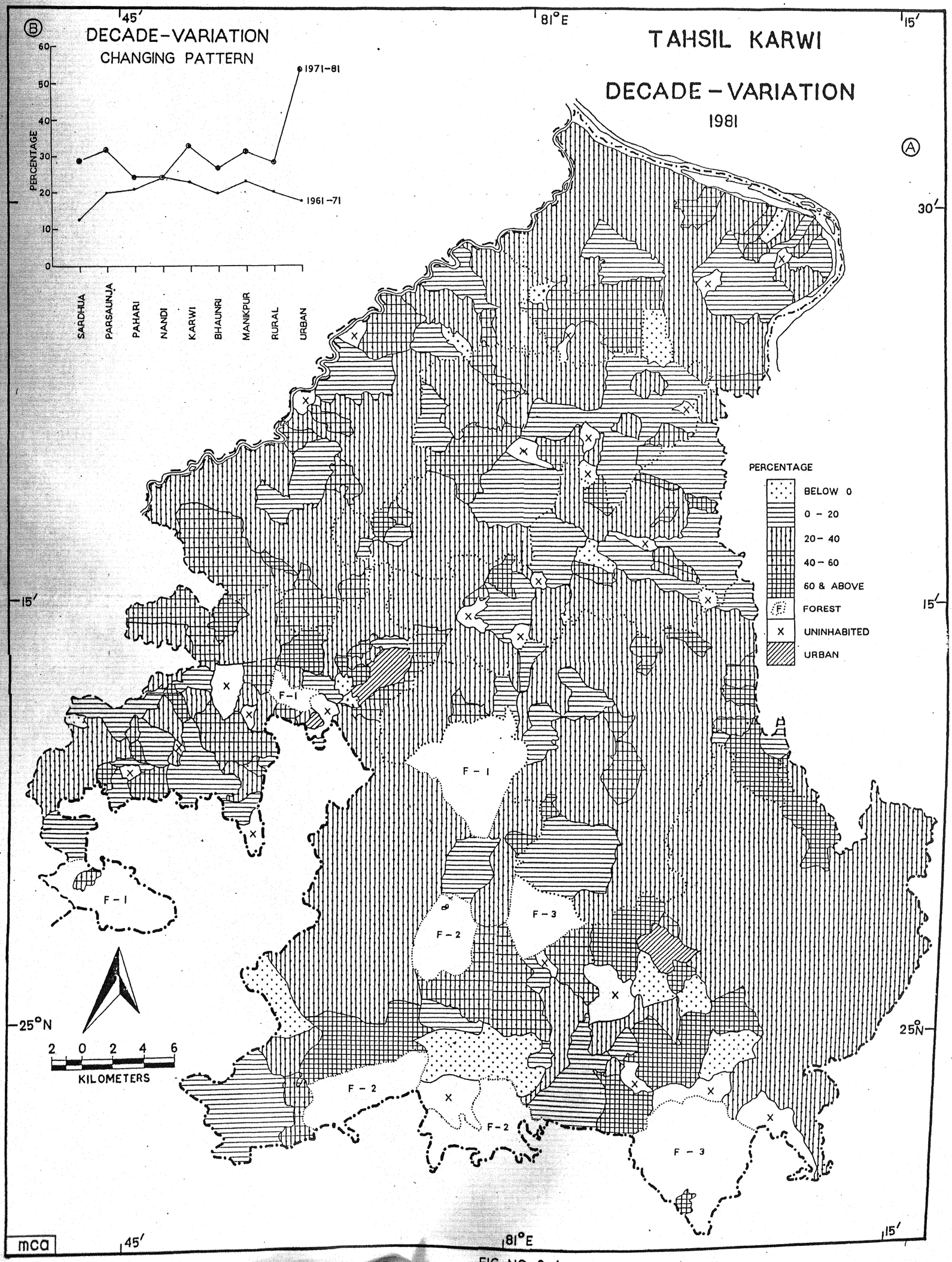

B
DECADE-VARIATION
CHANGING PATTERN
PERCENTAGE
60
50
40
30
20
10
0
1971-81
1961-71
SARDHUA
PARSAUNJA
PAHARI
NANDI
KARWI
BHAUNRI
MANIKPUR
RURAL
URBAN
45′
81°E
15′
TAHSIL KARWI
DECADE-VARIATION
1981
A
30′
15′
PERCENTAGE
BELOW 0
0 - 20
20 - 40
40 - 60
60 & ABOVE
FOREST
UNINHABITED
URBAN
F-1
F-2
F-3
25°N
2 0 2 4 6
KILOMETERS
mca

FIG. NO. 2.4

Table 2.5 : Population Variation (1961-71 and 1971-81).

K.Circles/ Decade	Total variation	Decade Variation (%)	Male Variation	Decade variation (%)	Female variation	Decade variation (%)
1961-71 Sardhua	3715	12.8	2169	14.08	1546	11.35
1971-81	9391	28.69	4742	26.99	4649	30.67
1961-71 Parsaunja	5431	20.08	3101	21.59	2330	18.37
1971-81	10355	31.89	5368	30.74	4987	33.22
1961-71 Pahari	5423	21.03	2833	20.94	2590	21.13
1971-81	7610	24.38	4105	25.09	3505	23.61
1961-71 Nandi	5179	24.20	2905	26.39	2274	21.88
1971-81	6426	24.18	3478	25.00	2948	23.27
1961-71 Karwi	6990	22.72	4137	25.57	2853	19.56
1971-81	12125	32.12	6143	30.24	5982	34.30
1961-71 Bhaunri	6261	19.71	3529	20.94	2732	18.32
1971-81	10145	26.68	5125	25.14	5020	28.45
1961-71 Manikpur	7257	23.05	4133	25.11	3124	20.85
1971-81	12119	31.28	6689	32.41	5430	29.99
1961-71 Total Rural	40256	20.41	22807	21.96	17449	18.68
1971-81	68171	28.70	35650	28.15	32521	29.33
1961-71 Urban	3678	17.83	1996	17.68	1682	18.01
1971-81	13030	53.60	6969	52.45	6061	55.00
1961-71 Total Tahsil	43934	20.16	24803	21.54	19131	18.62
1971-81	81201	31.01	42619	30.46	38582	31.65

The change in sex-ratio represents the socio-economic status of the region on the one hand and change in brith and mortality pattern of the both sexes and their migrational behaviour on the other. Thus, it may be said that the study of sex ratio is de facto important for analysing regional structure of population of an area.

The study area is characterised by imbalanced sex composition. The want of female population is a social hazard to the region. It creates a variety of crimes and social disorder. In 1981 the sex ratio (number of female per thousand male) is recorded 879 which is greater than that of the district (871) and lesser than State average (886). In the study area, rural sex ratio (883) is higher than urban sex ratio (843). The basic factors responsible for lower urban sex ratio are lack of employment opportunities for women and residential problem in the urban areas. The basic factors contributing to the spatial and temporal variation in sex ratio are preponderance of males at birth, the different rate of mortality of two sexes at different ages and sex selectivity migration. Besides, child marriage resulting early motherhood, lack of education especially among women, and behavioural conservatism prevailing in the Hindu families are the other factors of utmost significance.

To present a spatial structure of sex distribution, sex

ratio for each village has been calculated and grouped in to five classes (Fig. 2.5A). The study reveals that 15.51% villages fall in the group of low (below 800) sex ratio while high to very high (above 900) sex ratio group comprises 42.38% of the villages representing better state of physico-cultural factors. The medium group consists of 42.11% villages. Besides, to present the distributional pattern on regional level sex ratio has also been calculated for each K. Circle (Table 2.6).

Table 2.6 : Sex Ratio (1981)

K.Circle	Sex Ratio			Variation in percentage	
	1961	1971	1981	1961-71	1971-81
Sardhua	884	863	888	-2.37	+ 2.88
Parsaunja	882	860	876	-2.49	+ 1.86
Pahari	905	907	893	+0.22	- 1.54
Nandi	944	910	898	-3.60	- 1.32
Karwi	901	858	876	-4.77	+ 2.09
Bhaunri	884	866	889	-2.04	+ 2.65
Manikpur	907	877	872	-3.34	-0.57
Total Rural	900	875	883	-2.78	+ 0.91
Urban	827	829	843	-0.24	+ 1.69
Total Tahsil	893	871	879	-2.46	+ 0.92

The sex ratio on K. Circle level ranges between 872 (lowest) in Manikpur to 893 (highest) in Nandi. The economic

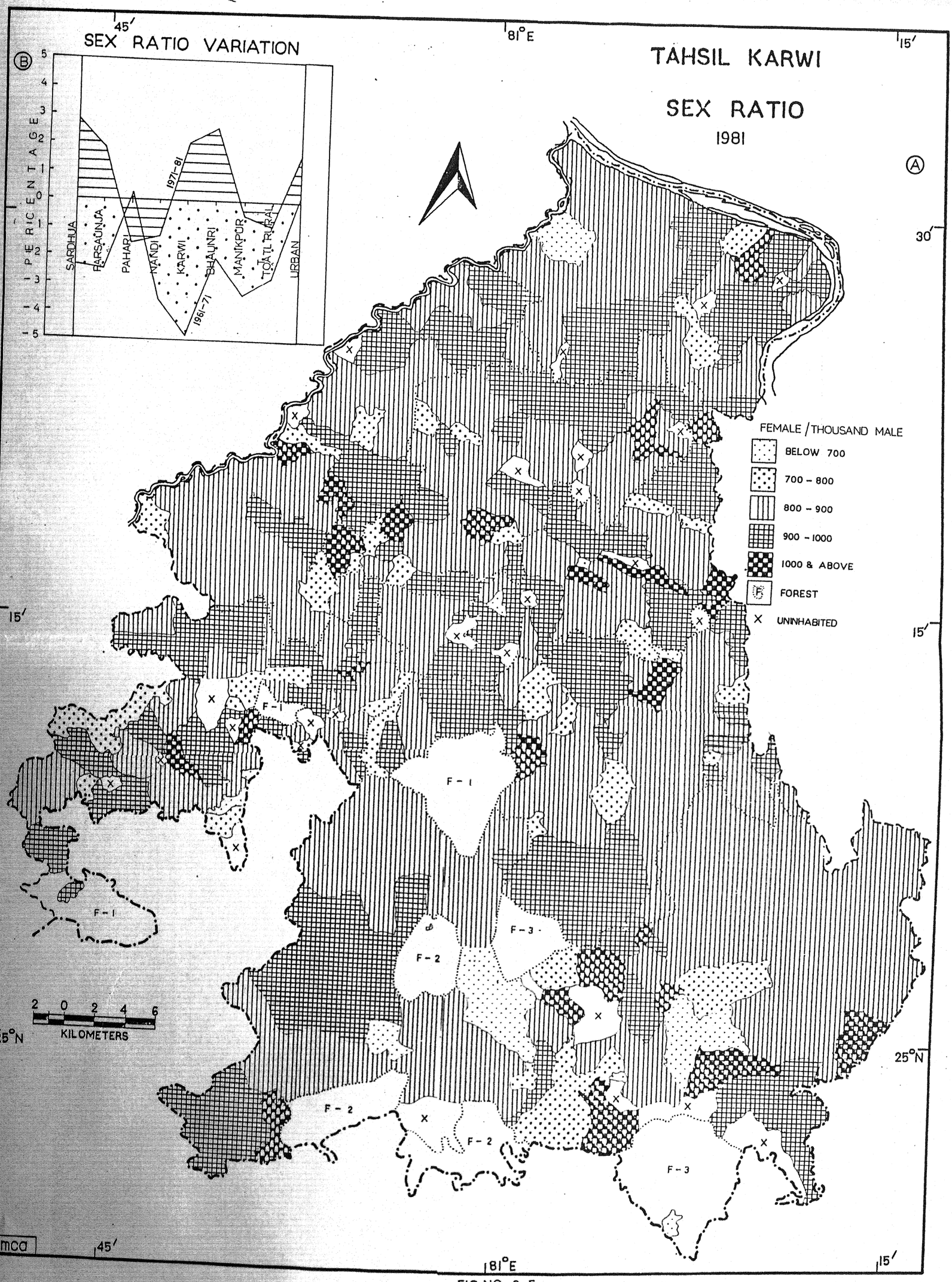

SEX RATIO VARIATION
B
5
4
3
2
1
0
1
2
3
4
5
PERCENTAGE
SARDHUA
PARSAUNJA
PAHARI
NANDI
KARWI
BHAUNRI
MANIKPUR
TOTAL RURAL
URBAN
1971-81
1961-71
45′
81°E
15′
TAHSIL KARWI
SEX RATIO
1981
A
30′
FEMALE / THOUSAND MALE
BELOW 700
700 - 800
800 - 900
900 - 1000
1000 & ABOVE
FOREST
UNINHABITED
15′
F - 1
F - 2
F - 3
2 0 2 4 6
KILOMETERS
25°N
mca
45′
81°E
15′

FIG.NO. 2.5

health of different areas is responsible for the areal differences in sex ratio having a bearing upon their migrational trend.

The study of changing pattern of sex ratio discloses that during 1961-71 decade Karwi tahsil recorded - 2.46% variation in sex ratio which is lesser than that of the district and State figures. Over all, decreasing trend of sex ratio variation has been observed. Pahari is the only circle showing positive variation (+0.22%). In the period 1971-81, the sex ratio follows the trend of increase (+0.92%) in the study area where as the district records a decreasing trend (-0.57). Negative variation is pointed out in Pahari, Nandi and Manikpur circles (Fig. 2.5B).

Literacy

Literacy plays an important role in the socio-economic development of a region. The trend of literacy is the indicator of the place at which a particular society is getting transformed.

According to 1981 census, only 20.84% population to total population is literate which indicates the social backwardness of the area. Literacy in the urban areas is recorded 42.88% because of more schooling facilities in towns while only 18.15% of rural population is literate. The male and female literacy in the study area are observed

33.15% and 6.83% respectively which reflects the depressing state of females in the society. The female literacy in urban areas is considerably higher. Table 2.7 presents the regional view of literacy distribution. The highest literacy is observed in Pahari circle (20.89%) while Manikpur circle stands at the lower rung (15.01%). The areas of low literacy are characterised by rugged terrain, scattered population and unplanned distribution of educational, facilities. Besides, people of these areas are tradition-bound and hardly like to have any social change.

Table 2.7 : Literacy (1981)

K. Circle	Percentage of Literates to total Population		
	Persons	Males	Females
Sardhua	16.96	28.61	3.77
Parsaunja	16.70	28.57	3.16
Pahari	20.89	35.28	4.78
Nandi	19.13	32.43	4.32
Karwi	19.31	32.27	4.51
Bhaunri	19.73	32.62	5.22
Manikpur	15.01	24.40	4.23
Total Rural	18.15	30.39	4.30
Urban	42.88	55.31	28.14
Total Tahsil	20.84	33.16	6.83

To present a relative distribution of literacy at village level, the location quotient of literates has been calculated for each village.

When the proportion of any characteristic in an area is studied in relation to its proportion in the region, the ratio used is known as 'Location Quotient'[20]. The hypothesis, underlying location quotient is that a location quotient less than one indicates less percentage of village in literacy than its share in tahsil; where as a location quotient greater than one signifies that village has more literacy than its normal share of tahsil. These two results of more than one or less than one are called as over represented and under represented literacy groups respectively.

On the basis of location quotient thus obtained, the villages of the study area have been grouped into four classes indicating over and under represented literacy groups (Fig. 2.6A). The regional analysis of location quotient reveals that all the circles except Pahari, is under represented. The rural and urban areas in toto are the zones of under and over represented literacy having L.Q. 0.87 and 1.36 respectively.

Scheduled Castes and Scheduled Tribes Population

The socio-economic status of scheduled castes and scheduled tribes population is the index of over all develop-

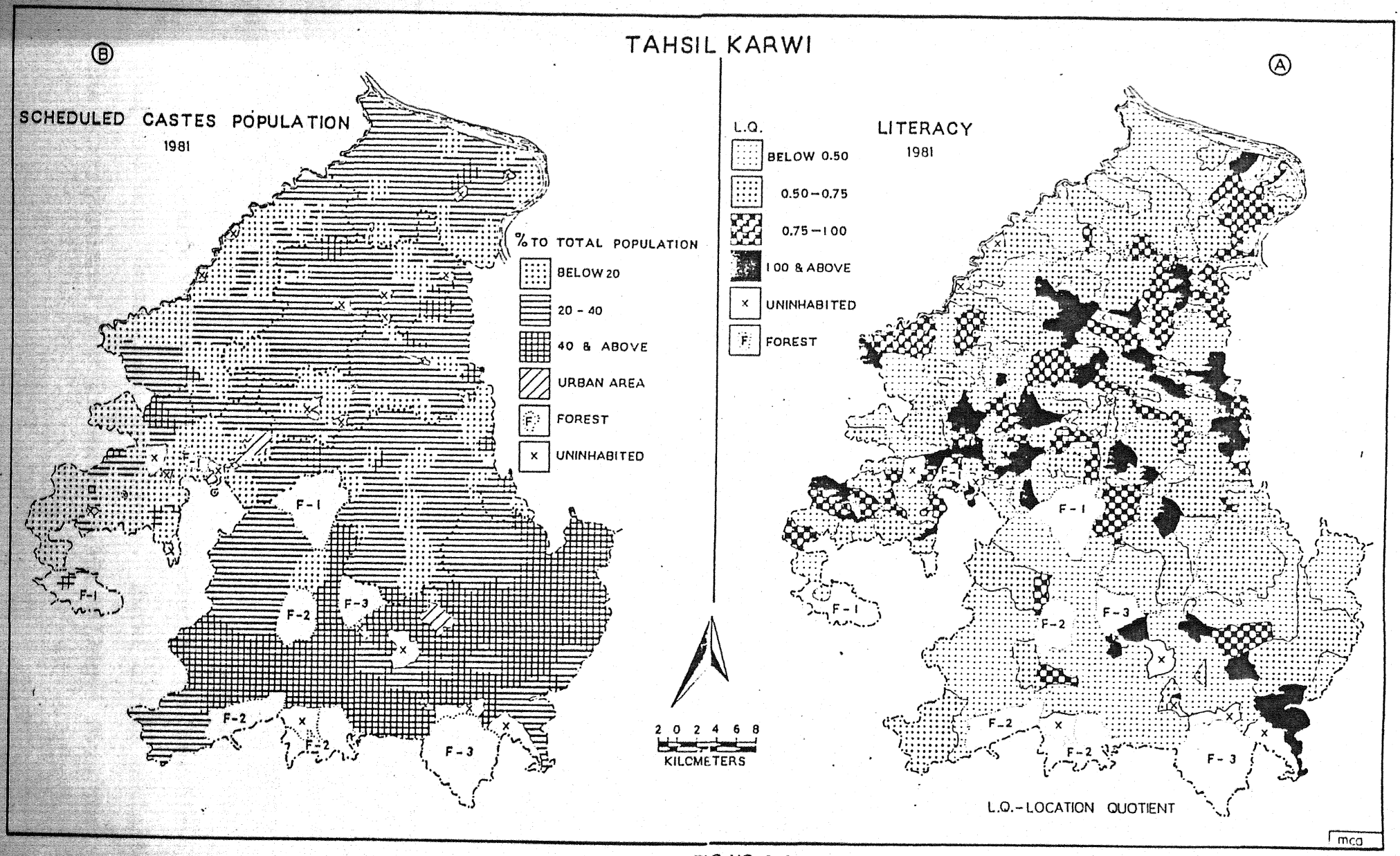

TAHSIL KARWI
(B)
SCHEDULED CASTES POPULATION
1981
% TO TOTAL POPULATION
BELOW 20
20 - 40
40 & ABOVE
URBAN AREA
FOREST
UNINHABITED
F-1
F-2
F-3
2 0 2 4 6 8
KILOMETERS
(A)
LITERACY
1981
L.Q.
BELOW 0.50
0.50 - 0.75
0.75 - 1.00
1.00 & ABOVE
UNINHABITED
FOREST
L.Q. - LOCATION QUOTIENT
mca

FIG.NO. 2.6

ment of an area. Inspite of various developmental plans implemented by government machinery, these groups are still underdeveloped due to high birth rate, ill health, meagre resources for their livelihood and their conservative behaviour towards different innovations.

As per 1981 census, scheduled castes constitute 26.03% to total population whereas scheduled tribes share a nominal percentage (0.004%). The rural scheduled castes percentage (27.15) is high than the urban percentage (16.80). Table 2.8 presents the distribution. of scheduled castes and scheduled tribes population on K. Circle level. Spatially speaking, the percentage of scheduled castes population varies from 19.39 (Karwi) to 43.95 (Manikpur). The higher percentage of female scheduled castes population to total female population of the study area is observed in each circle which represents the high sex ratio among these groups.

For the micro level analysis of the distributional pattern, thevillages of the study area have been grouped into three categories (Fig. 2.6 B). The areas of high concentration of S.C. population comprising 20.50% villages are extended over plateau and rugged terrain of Manikpur Circle and in a few localised pockets in the region. The areas of sparse population are well marked in the fertile land and some where along the rivers. Karwi circle dominates the distributional pattern where 63.38% villages form the

Table 2.8 : Scheduled Castes and Scheduled Tribes Population (1981).

K. Circles	Percentage to the total Population			
	Scheduled Castes			Scheduled Tribes
	Persons	Males	Females	
Sardhua	22.23	20.79	23.85	0.002
Parsaunja	21.25	21.02	21.54	0.005
Pahari	25.94	25.42	26.53	-
Nandi	29.25	29.15	29.37	-
Karwi	19.39	19.24	19.57	0.020
Bhaunri	26.56	26.27	26.87	-
Manikpur	43.95	43.76	44.17	-
Total Rural	27.15	26.84	27.75	0.004
Urban	16.80	16.44	17.23	-
Total Tahsil	26.03	26.75	27.61	0.004

group of lowest order. The area between the Baghain and the Paisuni rivers represents the low percentage group.

WORKING AND NON-WORKING POPULATION

The dynamics of physical and socio-economic set up of an area is associated with distributional pattern of working force and its occupational composition. Working population of a region is that part of population which is engaged in the production of economic goods and services. The distribution of labour force among various occupations, its

size, difference in participation rates by age, literacy and sexwise participation in different economic activities are the fair indices of the nature of economy prevailing in an area[21]. The occupational pattern of an area exhibits its diverse economic, demographic as well as socio-cultural attributes and provides a base for socio-economic planning.

In 1981 census, the population of an area has been divided into three categories i.e. main workers, partial workers and non-workers. Main worker is a person whose prime activity is the participation in any economically productive work by his physical and mental activities for more than six months in a year while the partial or marginal workers remain economically active for less than six months in the same period. Non-workers are economically parasite on working population. 35.62% of total population is engaged in different economic activities as against corresponding figure of 33.54% for district. The demographic, economic and social factors which are associated with size and structure of population, determine the proportion of workers. The marginal workers share 3.72% to total population while 60.66% population is parasite on working population. The groups of male and female main workers comprise 53.56 and 15.23 percent of their respective population. The percentage distribution of main workers bears a significance difference in urban and rural areas. Spatially speaking, the highest proportion of main workers is observed in the plateau

area of Manikpur circle (44.22%) followed by Sardhua (38.01%) and Parsaunja (35.16%). The working population of other circles ranges between 31.67 (Karwi) to 35.16 (Pahari) percent (Table 2.9). It is obvious that the population of male workers in all the circles of the region is high in comparison to the female due to illiteracy, restricted mobility, conservative attitude of the society towards female employment, old religious norms and lack of dignified job too. Female population of rural areas is more active than their urban counter part. In rural areas women of lower economic and social status work as agricultural labourers.

The percentage of marginal workers is highest (6.68) in Karwi circle followed by Pahari (5.86). Karwi, a largest urban centre of the region provides opportunities for seasonal job. The percentage distribution of non-workers ranges between 53.28 (lowest) in Manikpur to 62.78 (highest) in Bhaunri. The study divulges that percentage of marginal workers is greater (4.10) in rural areas than urban areas (0.66) while non-workers in urban area (71.63%) exceed non workers in rural areas. This represents that the regional economy is based on primary sector. Fig. 2.7 presents the village level distribution of working population.

Occupational Structure

Occupational structure is an important index to throw light upon economic dynamics of health and vigour of a region.[22]

KARWI TAHSIL

PERCENT OF MAIN WORKERS TO TOTAL POPULATION

1981

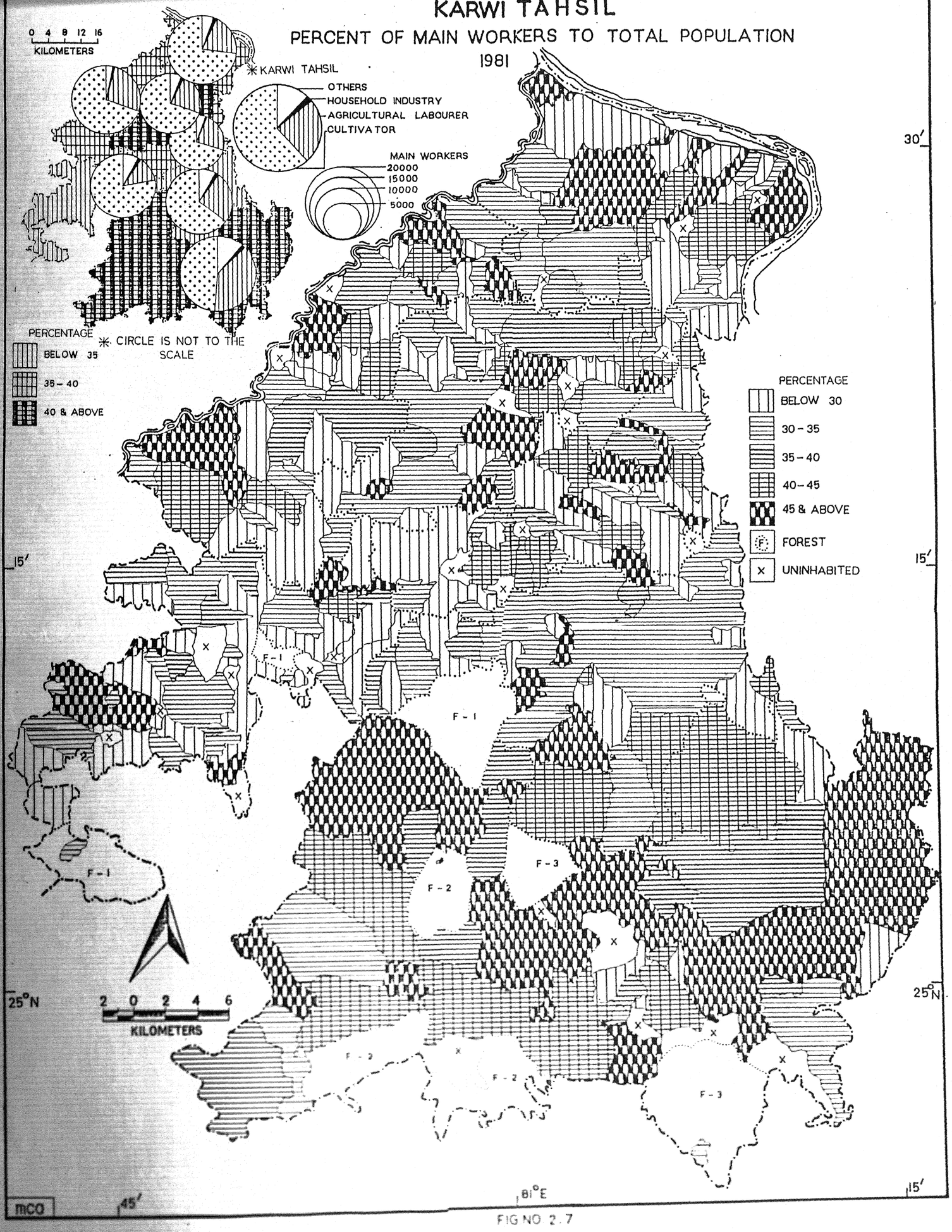


FIG NO. 2.7

Table 2.9 : Main-workers, Marginal Workers, and Non-Workers (1981).

K.Circles	Main workers %			Marginal Workers %			Non-workers %		
	To Total Population	Male to Total Male Population	Female to Total Female Population	To Total Population	Male to Total Male Population	Female to Total Female population	To Total Population	Male to total Male Population	Female to Total Female Population
Sardhua	38.01	54.33	19.62	2.43	0.63	4.45	59.56	45.04	75.93
Parsaunja	37.09	56.03	15.48	4.03	0.28	8.32	58.88	43.69	76.20
Pahari	35.16	54.23	13.87	5.86	0.69	11.72	58.98	45.08	74.41
Nandi	35.13	52.94	15.29	4.18	0.90	7.84	60.69	46.16	76.87
Karwi	31.67	51.19	9.61	6.68	1.19	12.88	61.65	47.62	77.51
Bhaunri	34.13	53.75	12.05	3.09	0.84	5.63	62.78	45.41	82.32
Manikpur	44.22	57.85	28.23	2.50	0.64	4.42	53.28	41.61	68.35
Total Rural	36.59	54.39	16.46	4.10	0.73	7.88	59.31	44.88	75.66
Urban	27.71	46.90	4.92	0.66	0.50	0.84	71.63	52.56	94.24
Total Tahsil	35.62	53.56	15.23	3.72	0.71	7.13	60.66	45.73	77.64

Utilization and exploitation processes of man power can be realized by analysing the occupational structure of working population. The division of working force into various economic activity groups is another significant aspect of economic composition. Census of India (1971) adopted the ninefold classification of workers making a slight modification in the recommendation of organization of united nations[23]. In 1981 census, the aforesaid ninefold classification has been revised to four fold ut infra :-

Agricultural Workers group

(1) Cultivators.

(2) Agricultural Labourers.

Industrial Workers Group

(3) House-hold industrial labourers.

(Workers engaged in manufacturing, processing, servicing and reparing).

Other Workers Group

(4) Other workers.

Workers engaged in -

(i) Live stock, forestry, fishing, hunting and Plantations, orchards and allied activities.

(ii) Mining and quarring,

(iii) Manufacturing, processing, servicing and repairing other than household industries.

(iv) construction,

(v) Trade and commerce,

(vi) Transport, storage and communication.

Agricultural Workers Group

The economy of the study area is based on agriculture. The rapid growth of population, high population density and lack of opportunities for employment other than agricultural sector, result the extensive scope of agricultural occupation. 85.77% to total workers comprises agricultural group consisting of 61.83% and 23.94% cultivators and agricultural labourers respectively. The corresponding figures for district Banda and Uttar Pradesh are 85.0% and 74.33% respectively, which is less than that of the study area. Land is a principal resource of livelihood and there is a general absence of secondary sources. As such, dependence on agriculture is high through out the region.

In the study area, the percentage of male and female cultivators is 85.15 and 14.85 respectively. Various social constraints and more pressing needs of females at home are the root cause of their lower participation in agriculture while the social taboos and biological constraints expressed through hard physical labour involved in several agronomic activities, prevent the full participation of females in agriculture in general and in agricultural labour in

particular.

The regional study divulges that percentage of cultivators is highest (77.59%) in Karwi circle followed by Sardhua (72.81%) and Nandi (70.45%) representing comparatively developed stage of agriculture. The lowest percentage of cultivators is observed in the Manikpur circle. The percentage distribution of agricultural labourers ranges from 36.80% (highest in Manikpur) and 13.15% (Lowest in Karwi) (Table 2.10). To measure the degree and direction of a linear correlation between cultivators and agricultural labourers, Karl Pearson formula has been used-

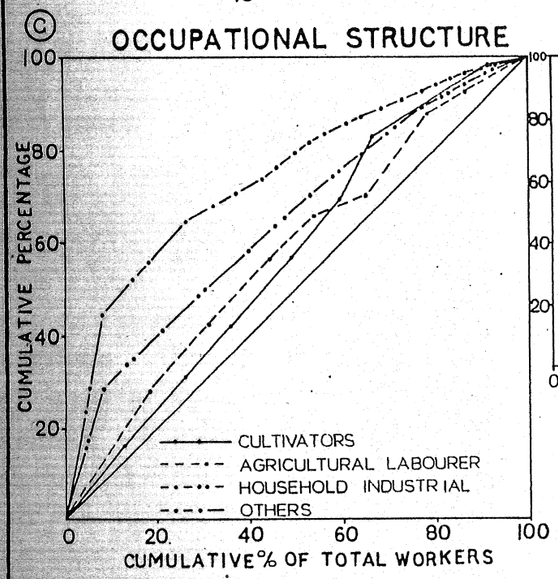
$$r = \frac{\Sigma XY - \frac{\Sigma X \Sigma Y}{N}}{\sqrt{\Sigma X^2 - \frac{(\Sigma X)^2}{N}} \sqrt{\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}}}$$

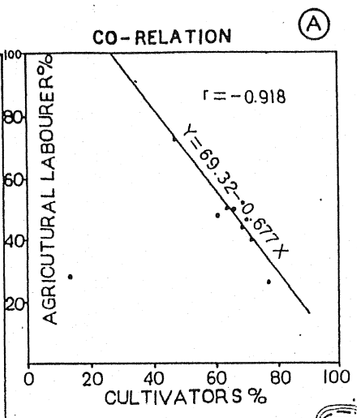
Using the above formula, the strong negative correlation (r = - 0.918) at 1% level of significance has been observed. Similarly, the linear regression equation (Y = 69.32 - 0.677 x) has also been derived to obtain a correlation between cultivators and agricultural labourers (Fig. 2.8A). The analysis concludes that the areas having the higher percentage of cultivators possess the lower percentage of agricultural labourers and vice versa. The areas of higher cultivators percentage are characterised with fertile land and availability of irrigational facilities while the reverse conditions are prevailing in the upland of Manikpur circle where

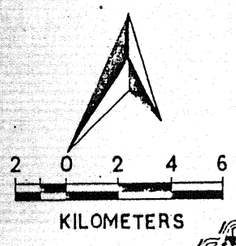
KARWI TAHSIL

LOCATION QUOTIENT FOR AGRICULTURAL EMPLOYMENT

1981







BELOW 0.75
0.75-1.00
1.00-1.25
1.25-1.50
1.50 & ABOVE
URBAN
FOREST
UNINHABITED VILLAGES

81°E
15′
45′
30′
25°N
F-1
F-2
F-3

FIG. NO. 2.8

Table 2.10 : Occupational Structure of Population (1981).

K.Circles	Agricultural Group						Industrial Group			Miscellaneous Group		
	Cultivators			Agricultural Labourers			House-hold Industry Labourers			Other workers		
	% to Total Workers	Male % of cultivators	Female % of Cultivators	% to Total workers	Male of Agri. Labourers	Female % of Agri. Labourers	% to total workers	Male % of H.I. Labourers	Female of H.I. Labourers	% to Total workers	Male % of other workers	Female % of other workers
Sardhua	72.81	80.16	19.84	20.20	56.91	43.09	2.06	84.54	15.56	4.93	83.52	16.48
Parsaunja	69.67	87.83	12.17	26.35	60.20	39.80	0.90	84.61	15.39	3.08	87.70	12.30
Pahari	69.59	85.56	14.44	22.87	66.13	33.87	1.69	81.38	18.62	5.85	90.71	9.29
Nandi	70.45	85.08	14.92	23.62	60.12	39.88	1.02	82.20	17.80	4.91	89.98	10.02
Karwi	77.59	87.32	12.68	13.15	73.09	26.91	1.62	78.99	21.01	7.64	93.11	6.89
Bhaunri	64.51	88.70	11.30	25.39	67.15	32.85	1.85	87.50	12.50	8.25	90.78	9.22
Manikpur	48.12	80.26	19.74	36.80	54.04	45.96	1.87	80.48	19.52	13.21	77.06	22.94
Total rural	66.22	84.96	15.04	24.86	60.65	39.35	1.61	82.75	17.75	7.31	85.19	14.81
Urban	14.32	94.47	5.54	14.05	71.18	28.82	7.02	94.63	5.36	64.61	95.51	4.49
Total Tahsil	61.83	85.15	14.85	23.94	61.17	38.83	2.07	86.17	13.13	12.16	89.84	10.16

cultivators and agricultural labourers share 48.12% and 36.80% (highest) to total workers respectively.

To present a spatial analysis of agricultural employment, location quotient has been calculated for each village of the study area using the formula -

$$L.Q.i = \frac{VR}{TR}$$

Where,

$$VR = \frac{\text{Employment in Agriculture in a village (Cultivators + Agricultural Labourers)}}{\text{Total population of a village.}}$$

$$TR = \frac{\text{Employment in Agriculture in the Tahsil}}{\text{Total Rural Population of the tahsil.}}$$

The location quotient, thus obtained, indicates the degree to which a specific area contains more or less share of its agricultural employment than in the region. In regional context, a higher or lower value of L.Q. indicates relative concentration or dispersion of agricultural employment. On the basis of location quotient, six levels of distribution have been decided (Fig. 2.8B). The study reveals that 62.88% villages exhibit the relative dispersion of agricultural occupants with below one L.Q.

The regional analysis of agricultural employment on K.Circle level denotes that Sardhua (1.06), Parsaunja (1.06) and Manikpur (1.13) circles present the concentration of agricultural workers. There are a few chances for employment in secondary and tertiary activities. Karwi circle (L.Q. -

0.86) exhibits the pattern of high dispersion. Chitrakoot Dham, the major urban centre provides the opportunities for employment in secondary and tertiary sectors.

Industrial Workers Group - The group comprises of household industrial labourers. In the study area, 2.07% to total workers are engaged in household industries as against a corresponding figure of 2.71% of district Banda and 4.39% of Uttar Pradesh. This is due to the fact that economy of the area under study is agrarian in nature and there is lack of infra structural facilities for industrial advancement. The industrial activities are mainly concentrated in urban areas with 7.02% to total workers engaged in industrial activities. The female participation in industrial activities is higher in rural areas than that of the urban areas.

The regional analysis of industrial workers discloses that the highest concentration is observed in Sardhua circle which is highly influenced by Rajapur town. The urban centre plays a significant role in the concentration of industrial population in Manikpur circle (1.87%). The lowest percentage of industrial workers is visualized in Parsaunja circle being deprived of transport facilities and urban influence.

Other Workers Group - The group engages 12.16% to total workers of which 89.84% workers are male. The corresponding figures for district and state are 11.28% and 21.26% respectively.

The percentage of other workers to total workers in urban population is higher (64.61%) than that of the rural population. Maximum concentration of other workers is observed in Manikpur circle (13.21%) with a maximum share of female population (22.94%) and is followed by Bhaunri (8.25%) and Karwi (7.61%) circles. The lowest percentage of other workers is observed in Parsaunja circle.

To measure the inequality in the distribution and to make a comparative appraisal of the distribution of different workers Lorenze curves have been drawn. The line of equal distribution, mentioned in the figure, represents hypothetical situation in which every circle for particular occupational group have the same percentage of workers to total workers. The deviation of any curve from the line of equal distribution is proportional to level of inequality in the distribution of different workers in relation to total workers. This shows that larger area lying between individual curve and line of equal distribution indicates higher concentration of individual workers group. A close examination of curves show that in terms of concentration of occupational workers, other workers rank at first and cultivators at last (Fig. 2.8C).

...

REFERENCES

1. Singh, D.K. et al.(1976) : 'Spatial Analysis of Rural Settlement Pattern in Orissa' in Geographic Diamension of Rural Settlements (Eds) Singh, R.L. et al., Varanasi, p. 124.

2. Despande,C.D.(1968) : 'Cities and Towns of Bombay Province'. The Indian Geographical Journal, Vol.XVI No.3, p. 268-9.

3. Barnes, A.J. and Robinson,A.H.(1940) : 'A New Method for the Representation of Dispersed Rural Population' Geog. Review Vol. 30, pp.134-137.

4. Mather,E.C.(1944) : 'A Linear Distance Map of Farm Population in United States' A.A.A.G., Vol.34, pp. 173-180.

5. Clark,P.J. and Evans,F.C.(1954) : 'Distance to Nearest Neighbour as a Measure of Relationship in Population', Ecology, Vol. 35,pp.445-453.

6. Dacey,M.F.(1965) : 'Order Distance in a Homogeneous Random Point Pattern' Cand. Geog., 9, pp. 144-153 cited by Singh, R.P.B.(1975) in Readings in Rural Settlement Geography, (Eds) Singh,R.L. et al., Varanasi, p.277.

7. Clark, P.J. and Evans, F.C.(1954). : loc. cit.

8. King, L.J. (1969) : Statistical Analysis in Geography, New Jersey, pp.99-100.

9. Singh,R.P.B.(1975) : 'Pattern Analysis of Rural Settlement Distribution and their Types in Saran Plain: A Quantitative Approach', in Readings in Rural Settlement Geography (Eds.) Singh,R.L. et al. Varanasi, p.281.

10. Dacey,M.F.(1964) : 'Modified Poisson Probability Law for Point Pattern more Regular than Random',A.A.A.G., 54, pp. 559-65.

11. Doxiadis,C.A.(1960) : 'Ekistics, An Introduction to the Science of Settlements', New York, p.33 cited by Singh,R.P.B.(1975) op.cit., p. 281.

12. Mandal, R.B.(1981) : Planned Development of Rural Settlement New Delhi,p.237.

13. Singh, S. and Chauhan: V.S.(1984) Regionalization for Rural Development and Planning, Meerut, p.59.

14. Mahto, K.(1974) : 'Pattern of Population Growth in Bihar' Indian Geographical Studies, Research Bulletin, No.2, p.28.

15. For Calculating the exponential population the formula has been used -

$$m = 8\sqrt{p81/po1} \quad \text{and} \quad F = piXm = pi + 1$$

Where po1 = the population of starting year (1901)

p81 = the population of last year (1981),

pi = the population of base year

pi+1 = the exponential population of next decade.

16. Census of India (1951) Vindhya Pradesh, Vol. XVI, Part I., p.30.

17. Krishna,G.(1971) : 'Distribution and Density of Population in Upper Bari Doab', National Geographer, Vol.6, p.34.

18. Trewartha,G.T.(1953) :'A case for Population Geography', A.A.A.G., Vol.XLIII, No.2,p.94.

19. Singh, H.P.(1979) : Resource Appraisal and Planning in India, New Delhi p.64.

20. Mohmood, A.(1977) : Statistical Methods in Geographical studies,New Delhi, p.104.

21. Clarke,J.I.(1966) : Population Geography, London, p.14.

22. Singh, H.P.(1979) : Op.cit., p.67.

23. District CensusHand Book, District Banda, 1971.

...

CHAPTER - III

SPATIAL STRUCTURE OF ECONOMY

Development of economy and improvement of the living conditions of inhabitants of a region is the basic goal of all developmental processes and plans. A successful plan can not be worked out without assessing the existing base of the area. The present chapter has, therefore, been designed to present the spatial structure of economic activities viz. agriculture, animal husbandry, mining, forestry and industry.

Agriculture

The agricultural and allied sectors have been emphasized vitally by integrated development-planners, as these activities are predominant in the rural economy and provide a livelihood for majority of the people. Agriculture contributes a large share to the income of rural people and plays a very crucial role in the economic development of a region. All rural development programmes are, therefore, central to its development.

The agriculture of the study area is still underdeveloped and the yield from land is very low. Before we prepare a proposal of agricultural development plan it is, therefore, necessary to make a critical deliberation and assessment of existing conditions and effective constituents of agriculture, crop landuse and regional imbalances in levels of agricultural productivity.

Agriculture is the most important sector of economy

of the study area employing 85.77% of total working population. Population pressure on agricultural resource has steadily increased due to higher growth rate of population on one hand and slower increase in cultivated land and industrial development on the other. During the decade of 1970-80, there has been a marked variation of 31.01% in total population while net area sown has increased only by 0.06%.

As the regional economy of the study area is based on agriculture, agricultural landuse secures a place of significance. A careful landuse study in respect to its resource utilization pattern, is a pre-requisite while making a plan for maximum return from land based on optimum utilization of the cultivated land and maintenance of agronomic balance among agriculture, forests, grazing grounds, settlements and means of communication.

LANDUSE PATTERN

Landuse is an important aspect of geographic studies particularly relevant to agricultural geography. The amount of land and its quality, intensity of its use for plants and animals and degree to which it is modified by man to increase its production are all essential in consideration of land utilization in any country[1]. Present landuse is the result of different causes, many of which are directly related to nature and quality of land resources while other have their

origin in cultural, social and economic conditions of the past. At present juncture of traditional and modernized agricultural practices, a regional assessment of landuse and its scientific utilization has become pre-requisite with a view to eliminate the misuse of land resources.

General Landuse

The general landuse pattern of the study area is quite different from the other parts of the district due to its lithology, terrain, soil productivity, settlement pattern, changing economy and social setup. According to agricultural census of India, the land is basically divided in to nine categories[2]. These categories have been summed up into the following classes - (i) net area sown, (ii) land not available for cultivation, (iii) forest, (iv) other culturable land and (v) fallow land.

The total reported area of the tahsil is 524117 acres of which 59.63% is under cultivation. Land not available for cultivation, including land put to non agricultural uses and barren and unculturable land covers 16.12% of total area. The forest and other culturable land possess 16.23% and 8.02% area respectively (Table 3.1).

The study of changing pattern of landuse reveals that during the period of ten years (1970-80), net area sown

Table 3.1 : General Land Use (1980-81)

(Area in acres)

K. Circles	Net Area Sown	Land not available for cultivation		Forest **	Other culturable land	Fallow land
		A	B			
Sardhua	41553 (74.92)*	4632 (8.35)	1780 (3.21)	186 (0.33)	1846 (3.33)	5469 (9.86)
Parsaunja	42357 (75.23)	2453 (4.36)	1849 (3.28)	711 (1.27)	2245 (3.98)	6694 (11.88)
Pahari	37861 (77.60)	1930 (3.96)	636 (1.30)	175 (0.36)	2305 (4.73)	5879 (12.05)
Nandi	31919 (72.54)	1888 (4.29)	744 (1.69)	206 (0.47)	2511 (5.71)	6734 (15.30)
Karwi	32071 (59.28)	4202 (7.77)	4842 (8.95)	1843 (3.41)	4440 (8.21)	6699 (12.38)
Bhaunri	34646 (47.99)	3990 (5.53)	12807 (17.74)	5290 (7.33)	7000 (9.69)	8460 (11.72)
Manikpur	34187 (17.69)	6115 (3.16)	36640 (18.96	76605 (39.64)	21719 (11.23)	17998 (9.32)
Tahsil Karwi	254594 (48.57)	25210 (4.81)	59298 (11.31)	85016 (16.23)	42066 (8.02)	57933 (11.06)

Source.- Unpublished Record, Office of Tahsildar, Karwi (Banda)

A. Land put to non-agricultural uses. B. Barren and unculturable land.

* Figures in parenthesis denote % to total Reported area.

** Forest includes area under forests, orchards and groves under the management of revenue Department.

has remained constant. It represents that there is no extension of cultivated land during the said period. Increasing percentage of land put to non-agricultural uses (roads, canals, settlements etc.) may be taken as good symbol of development. Decreasing trend of barren and unculturable land and other culturable land on one hand and increasing percentage of area under forests and orchards on the other show a positive trend in the changing pattern of landuse in the study area, but increasing trend of fallow land is certainly a alarming position. The percentage variation of each category of land use is shown in table 3.2.

Table 3.2 : Changing Pattern of Land use.

Land Use Category	% of Total Reported Area			% Variation
	1970-71	1975-76	1980-81	1970-71 to 1980-81
1. Net Area Sown	48.54	47.59	48.57	+ 0.06
2. Land not available for cultivation				
A. Land put to non-agricultural uses	4.70	4.73	4.81	+ 2.31
B. Barren and uncultivable land	12.48	12.52	11.31	- 9.29
3. Forest	15.01	15.13	16.23	+ 8.01
4. Other culturable land	10.71	9.92	8.02	-25.03
5. Fallow land	8.56	10.11	11.06	+29.18

To make a comparative study of landuse pattern on regional level, major landuse categories have been discussed here (Fig. 3.1A).

Forests - The forests including Orchards play an important role in the economy of the study area. The distribution of forests accords to topography as most of the forest area is spread over southern upland comprising Manikpur circle and southern parts of Bhaunri and Karwi circles. Manikpur circle has the largest area (39.64%), under forests. In Sardhua, Pahari, Parsaunja and Nandi circles of lowland region, forests have been cut down to make room for cultivation. These circles share a negligible percentage of land under forests.

Net area sown (NAS) - The pattern and intensity of land resource utilization is observed through the distribution of net area sown which is the result of early start of agricultural practices, dependency and extent of pressure of population with the combination of physical factors . The lowland part of the study area shares the high percentage of net area sown. Pahari circle records highest percentage (77.60) of land under this category and is followed by Parsaunja (75.23), Sardhua (74.92) and Nandi (72.54) circles. The lowest percentage of net area sown is observed in Manikpur circle due to unsuitable physical factors.

Land put to non-agricultural uses - The area under settlements,

KARWI TAHSIL

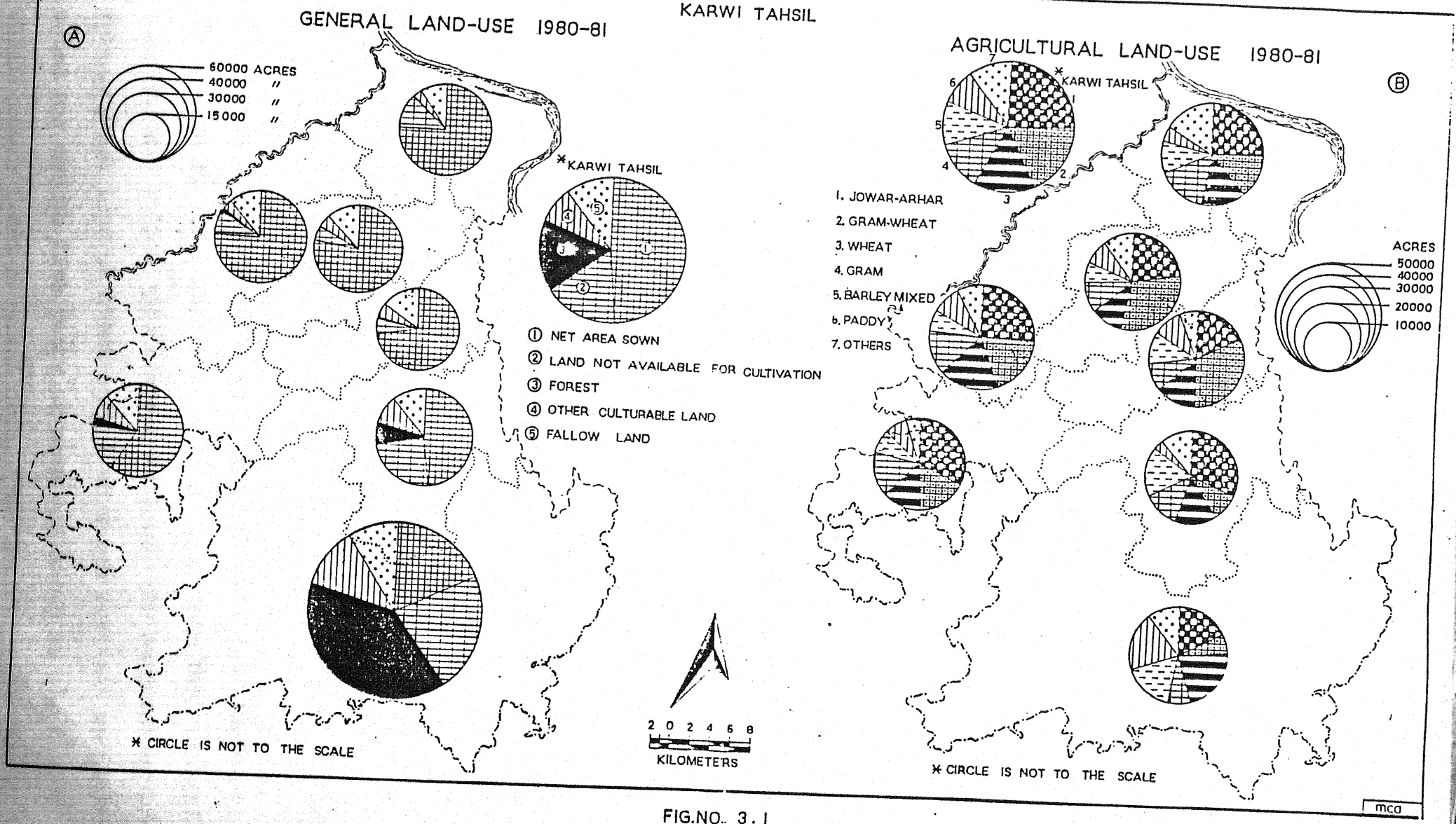


FIG.NO. 3.1

roads, water bodies, railways, cart tracks, grave yards, crematorium etc. is 25210 acres (4.81%). On regional basis the percentage of land under above use is highest (7.77) in Karwi circle and lowest (3.16) in Manikpur circle.

Barren and unculturable land - It includes all barren and unculturable land like mountains, hills, usar land etc. which can not be brought under cultivation except at a very high cost. This category of land use covers 11.31% of total reported area. Southern upland rocky area shares highest percentage under barren and unculturable land.

Other culturable land - The other culturable land includes cultivable waste land and area under miscellaneous crops and groves occupying 8.02% of total area. Cultivable wastes are the potential land which can be brought under cultivation after reclamation. High percentage of cultivable waste in Manikpur, Bhaunri and Karwi circles represents the high potentiality of extension of cultivated land. The percent variation of other culturable land ranges between 11.23% in Manikpur and 3.33% in Sardhua circles.

Fallow land - The total fallow land and net area sown present the extent of arable land in contrast to land that is not cultivated at all. Fallow land is divided into two categories i.e. (i) old fallow and (ii) current fallow. The marginal or sub-marginal land or other such land which are left uncultivated for two to five years or more are known as old fallow which covers 1.45% of total area. The current fallow land

is the area, left fallow only during current year for reoccupying the fertility of the soil and claims 9.61% of the total reported area. High percentage of fallow land is observed in Nandi circle (15.03) which is followed by Karwi (12.38), Pahari (12.05), Parsaunja (11.88) and Bhaunri (11.72)circles.

Agricultural Landuse

Cropping Pattern

Cropping pattern means the proportion of area under various crops at a point of time. The cropping pattern differs from from macro to micro region both in space and time and governed largely by physical, cultural and technological factors[3]. There are two main crop seasons i.e. Rabi and Kharif in the tahsil. Rabi crops (57.07%) occupy larger area than kharif (42.93%). The kharif crops such as jowar, bajra, paddy (partially irrigated), pulses etc., are purely rainfed crops sown in the month of June-July with start of rains. These crops required greater quantity of soil moisture. The rabi crops include gram, wheat, barley etc. which are sown in the month of October-November in the last phase of rainy season.

A general perusal of cropping pattern shows that the region is primarily food grain producing. The cropped area is governed by food grains covering 95.35% of total cropped area. Oil seeds, consisting of linseed and sesame, occupy

1.08% of the total cropped area. Fiber crops and others possess negligible acreage. The principal rabi crops include gram-wheat (gochana) 18.21%, wheat 15.12%, gram 12.17% and Barley mixed with gram/wheat (bejhar/gojai) 10.80%. Jowar mixed with arhar is main kharif crop covering 24.40% of total cropped area and is followed by paddy (8.88%) and Bajra-arhar (5.39%). Other minor crops including pulses, savan, kodon, oilseeds, sugarcane etc., occupy 5.03% of total cropped area. Table 3.3 presents area under different crops on K.Circle level. There is marked variation in the cropping pattern of northern lowland than that of the southern upland. Generally, the crops of low water requirement i.e. bajra, arhar, gram etc. dominate in the northern part while crops of high water need such as wheat and paddy are significant in the southern region (Fig. 3.1B). As a whole irrigational facilities play a dominant role in determination of cropping pattern.

Mixed Cropping - One of the outstanding characteristics of the cropping pattern in the study area is practice of sowing two crops of different water requirement mixed together. About 58.8% area in both kharif and rabi crops is devoted to mixed cropping. During Kharif season jowar mixed with arhar and bajra mixed with arhar occupy 24.40% and 5.39% respectively. Similarly, in rabi season 18.21% and 10.80% of total cropped area is devoted to gram-mixed with wheat (gochana) and

Table 3.3 : Area under Different Crops (1980-81)

(In acres)

K.Circles	Crops								
	Jowar-Arhar	Gram-wheat	Wheat	Gram	Barley Mixed	Paddy	Bajra-Arhar	Other Crops	Total Cropped area
Sardhua	11211 (24.39)	6453 (14.04)	6446 (14.02)	7094 (15.43)	4669 (10.16)	2168 (4.72)	6920 (15.06)	1003 (2.18)	45964
Parsaunja	12236 (25.52)	9134 (19.05)	8729 (18.21)	6494 (13.55)	3053 (6.37)	4252 (8.87)	1995 (4.61)	2046 (4.27)	47939
Pahari	9554 (22.57)	12918 (30.52)	4539 (10.72)	4346 (10.27)	2861 (6.76)	3494 (8.25)	2903 (6.86)	1708 (4.05)	42323
Nandi	6532 (17.45)	12135 (32.40)	5106 (13.63)	3552 (9.48)	4004 (10.69)	3619 (9.66)	1243 (3.32)	1261 (3.37)	37452
Karwi	11748 (32.24)	6014 (16.51)	4835 (13.24)	5859 (16.08)	3017 (8.28)	2911 (7.99)	732 (2.01)	1330 (3.65)	36436
Bhaunri	12223 (31.76)	3567 (9.27)	5367 (13.94)	4917 (12.78)	6668 (17.33)	1289 (3.35)	1059 (2.75)	3393 (8.82)	38483
Manikpur	7214 (17.52)	2538 (6.16)	8792 (21.35)	3012 (7.32)	7017 (17.04)	8010 (19.46)	762 (1,85)	3828 (9.30)	41173
Tahsil Karwi	70718 (24.40)	52759 (18.21)	43804 (15.12)	35274 (12.17)	31289 (10.80)	25743 (8.88)	15614 (5.39)	14569 (5.03)	289770

Note - Figures in parenthesis denote percentage to total cropped area.

Source - Unpublished Records Office of Tahsildar, Karwi (Banda).

barley with gram (bejhar) and wheat (gojai) respectively. The mixing of two or more crops with different water requirement becomes almost necessary to secure atleast one crop in a year of abnormal rainy season.

Spatial pattern of Crops

A number of crops are grown in mixed form but few of them are important for acreage and production. Food crops have a direct bearing on the productive land and distribution of population, whereas commercial and industrial crops lag behind because they are relevant only to the industrial aspect of the region.

In order to highlight the areas where different crops attain particular significance, a deviation index[4] has been calculated. Taking the tahsil's average percentage of net area sown under particular crop as 1, the deviations have been obtained at K. Circle level for all the significant crops. Fig. 3.2 exhibits the distribution of various crops based on deviation index.

Jowar-Arhar - Jowar, the chief millet of the region is grown with arhar in kharif season entirely as rainfed crop on 24.40% of total cropped area. It is easily adopted to normal drought and rainy conditions and is successfully cultivated on ordinary and poor soils. Jowar-arhar has above average

TAHSIL KARWI

SPATIAL PATTERN OF CROPS

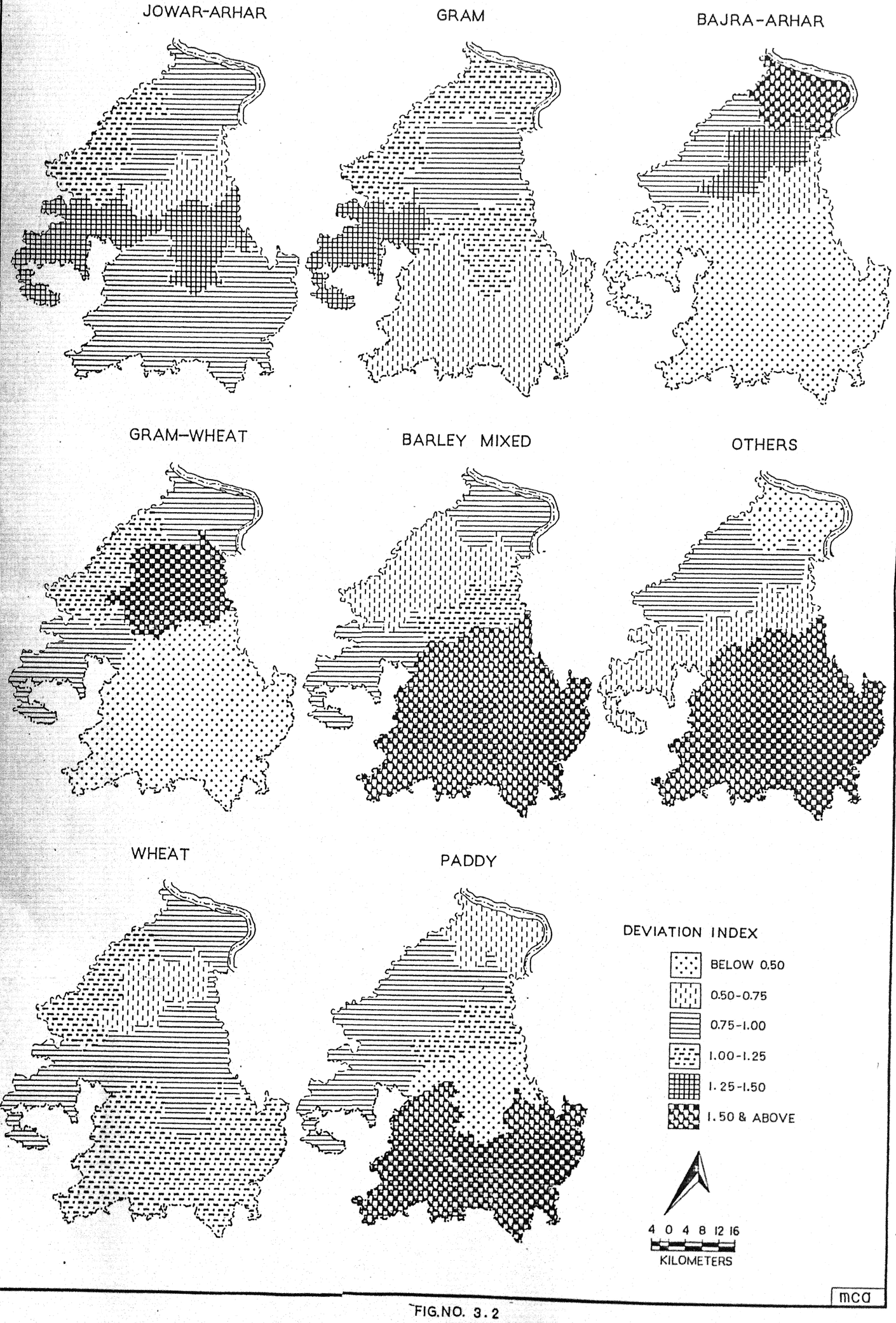


FIG.NO. 3.2

significance in Karwi, Bhaunri and Parsaunja circles attaining score value above 1.

Gram-Wheat - It is the most important rabi crop and is cultivated on 18.21% of total cropped area. Undoubtedly, its introduction is a device to safeguard the regional crops from total failure by vicissitudes of natural calamities. The areas of Nandi and Pahari circles are pre-eminently gram-wheat producing and secure the highest score (Above 1.60).

Wheat - The wheat is grown on 15.12% of total cropped area with support of irrigation, fertilizers and hybrid seeds. It is also being practised on less fertile and unirrigated land. The impact of irrigation on wheat cultivation can be visualized in Sardhua, Parsaunja and Bhaunri circles where more than 80% of the land under wheat is irrigated. Wheat obtains prominence in Manikpur (1.24) and Sardhua (1.19) circles.

Gram - Gram, the important rabi pulse covers 12.17% of total cropped area. It is fairly distributed in the whole region. Karwi, Sardhua, Parsaunja and Bhaunri circles are notable for gram cultivation attaining deviation index above 1.

Barley mixed - Barley is grown mixed with wheat and gram. It is harder than wheat and more adoptable to variable condition of rainfall and soils. Barley is significant crop specially for the unirrigated land. The average area under barley cultivation is 10.80% of total cropped area. Barley

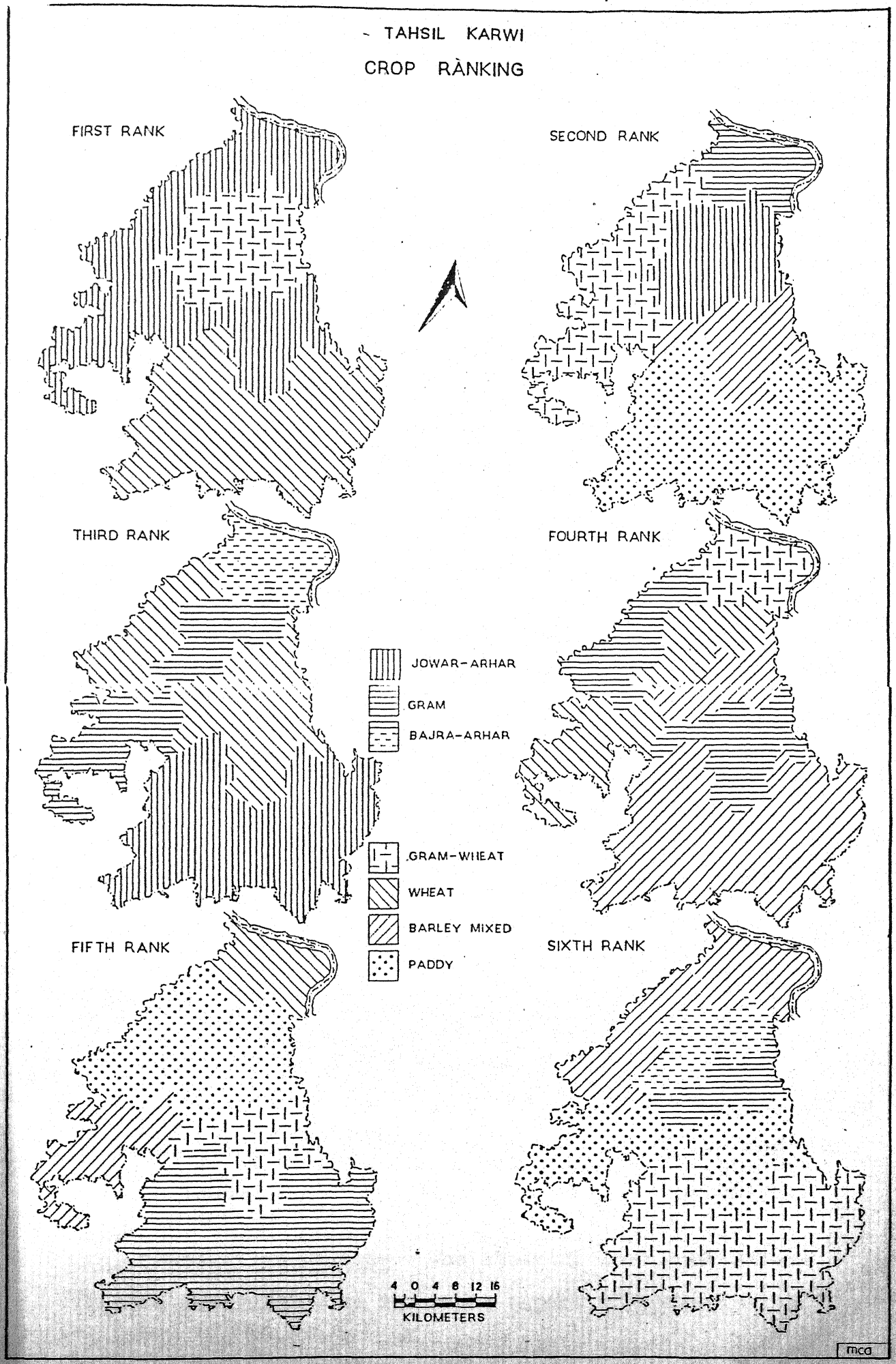

- TAHSIL KARWI
CROP RANKING
FIRST RANK
SECOND RANK
THIRD RANK
FOURTH RANK
FIFTH RANK
SIXTH RANK
JOWAR-ARHAR
GRAM
BAJRA-ARHAR
GRAM-WHEAT
WHEAT
BARLEY MIXED
PADDY
4 0 4 8 12 16
KILOMETERS
mca

FIG. NO. 3.3

in Sardhua, gram-wheat in Paraunja and Karwi, Jowar-arhar in Pahari and Nandi, Barley mixed in Bhaunri and Paddy in Manikpur circles. Wheat comes in first order of third ranking crops which is concentrated in Parsaunja, Nandi and Bhaunri circles. Fourth ranking crops are gram-wheat in Sardhua, Gram in Parsaunja and Bhaunri, wheat in Pahari and Karwi, barley mixed in Nandi and Manikpur circles. Paddy stands in first order among fifth ranking crops. Barley mixed, bajra, arhar, gram paddy and gram-wheat prevail in sixth rank.

Crop Combination

The importance of combinational analysis of different elements in geographical studies has greatly increased attention. The more scientific presentation of the facts by such studies is minimizing the chance of over simplified generalization. For a comprehensive and better understanding of the agricultural mosaic of an agro-climatic region, the study of crop combinations is of great significance[5]. Characteristically, the cultivation of the crops is seen in combinational associations, therefore, an integrated analysis of crops is essential to understand the geographic pattern of crop landuse.

Crop Combination Regions - The study of crop combination regions constitutes an important aspect of agricultural

geography as it provides a good basis for agricultural regionalization.

In the delineation of crop combination regions various arbitrary and deviation methods have been used so far. But the most valuable statistical formula was developed by Weaver[6]. For determination of combinations with minimum deviation, Weaver calculated deviation of real percentages for all the possible combination in an area considered against theoretical standard which was 100% in one crop, 50% in each of the two crops, 33.33% in each of three crops combinations and so on.

For the determination of minimum deviation the following formula was used :-

$$SD = \sqrt{\frac{\Sigma d^2}{n}}$$

Where SD = Standard Deviation

d = Difference between the actual crop percentage in a given areal unit and the appropriate theoretical percentage.

n = number of crops.

Since only relative rank of amount of deviation is required. The square root may be ignored and formula may be used as -

$$\delta^2 = \frac{\Sigma d^2}{n}$$

The minimum deviation method advanced by Weaver tends to include all the crops in the series and the resultant combination becomes over generalized. In order to remove this shortcoming Rafiullah[7] modified the Weaver's formula and introduced a new deviation method known as 'Maximum Positive Deviation' method. The technique devised by Rafiullah may be expressed as follows :-

$$d = \sqrt{\frac{\Sigma D^2 p - \Sigma D^2 n}{N^2}}$$

Where d = deviation

$\Sigma D^2 p$ and $\Sigma D^2 n$ = Sum of square of positive and negative deviations from middle of theoretical value.

N = Number of crops

To avoid more calculation formula may be simplified as -

$$d^2 = \frac{\Sigma D^2 p - \Sigma D^2 n}{N^2}$$

The maximum positive deviation, thus obtained gives the critical combination.

In the present study both methods have been used and the study area has been divided into 3 crop combination regions of first order. Fig. 3.4A. Comparative analysis of crop combinations based on Weaver's and Rafiullah's methods results that the latter is either identical or includes lesser number of crops in combination than the

TAHSIL KARWI

CROP COMBINATION REGIONS

(A)

(AFTER RAFIULLAH)

GRAM-WHEAT DOMINATING REGION

JOWAR-ARHAR DOMINATING REGION

WHEAT DOMINATING REGION

JA JOWAR-ARHAR
GW GRAM-WHEAT
BA BAJRA-ARHAR
BM BARLEY MIXED
W WHEAT
G GRAM
P PADDY

JA G BA GW

JA GW W G

GW JA G

GW JA

JA GW

JA BM W G

W P JA BM

4 0 4 8 12 16
KILOMETERS

CROPPING INTENSITY

(B)

BELOW 105
105-110
110-115
115-120
120 & ABOVE
NO CULTIVATED LAND

URBAN

F-1

F-2

F-3

2 0 2 4 6
KILOMETERS

30′

15′

25°N

mca

45′

81°E

15′

FIG.NO. 3.4

former. The difference is pointed out in only those cases where difierence among actual value is large. In such cases weaver's method fails to delineate a precise combination but the combinations delineated by using Rafiullah's device are true representation of primary crops.

None of the circle comes under mono crop combination. The result obtained from Weaver's method explains that Parsaunja, Bhaunri and Manikpur circles form five crop combination region while remaining circles are characterised with six crop combinations. On the basis of results derived from Rafiullah's method, the study area can be divided into two crop, three crop and four crop regions.

Cropping Intensity - Cropping intensity refers to the number of crops sown in a particular field. In the present agro-based Indian economy, cropping intensity is based on availability of irrigational facilities, use of fertilizers, improved seeds and mechanization. Size of holdings also plays an important role in determination of cropping intensity as farmers can successfully utilize the family labour and other inputs in small size fields. The concept of cropping intensity has been presented as an index of cropping intensity, using the following formula :-

$$\text{Cropping Intensity Index (CI)} = \frac{\text{Total Cropped Area}}{\text{Net Area Sown}} \times 100$$

The cropping intensity index (CI) for Karwi tahsil is

113.81. At K. Circle level, Manikpur records highest cropping intensity (120.55) and is followed by Nandi (117.33), Parsaunja (113.17) and Karwi (113.61). The lowest cropping intensity in Manikpur circle is due to the fact that the region obtains heavier rainfall than its northern counterpart. The stagnant water make rooms for cultivation of paddy in Kharif and wheat in rabi seasons. Besides, few small canals developed by constructing bunds on small nalas and a number of local tanks also provide water for irrigation. Moreover, various development plans implemented by government machinery for 'Patha' area development such as Drought Prone Area Project, enhanced the cropping intensity in the region.

For the micro level spatial analysis, the cropping intensity of individual village has been calculated and depicted cartographically (Fig. 3.4B). The study divulges that 48.34% villages form the group of low to very low intensity (below 110) while high and very high intensity group (115 and above) comprises 37.34% villages. The medium (110-115) intensity group consists of 14.32% villages. In general, the villages of low cropping intensity is characterised with less percentage of irrigated area. The variation in cropping intensity is mainly due to variation in irrigated area and partially due to rainfall and specialised cropping.

AGRICULTURAL PRODUCTION AND PRODUCTIVITY

The low agricultural production, the main problem of the area, has affected the econony of the people up to a great

extent. The people are so poor that they can not invest money in this sector for better agricultural performance. The vicious circle of poverty in agriculture starts from the point of low agricultural production and follow with low marketable surplus, low bargaining power, low income, low saving, low investment for land improvement and it ultimately ends in low agricultural production.

Agricultural productivity is thus, a function of interplay of physical and cultural variables and it manifests itself, through per hectare productivity and total volume of production[8]. The production of different crops in the study area is considerably low in comparison to state figures due to environmental and ecological limitations (Fig. 3.5 A). Intensity of irrigation, physico-chemical property of the soils and socio-economic status may be assigned as the basic factors for low agricultural production.

Measurement of Productivity

The measurement of agricultural productivity is of prime importance for differentiating the areas of high and low productivity and it enables us to know the areas which need more attention for increasing productivity. Owing to multitudinous utility, the scholars have developed various techniques for measurement of agricultural productivity. The application of techniques reveals that most of them suffer from one or other weakness and often fail to give

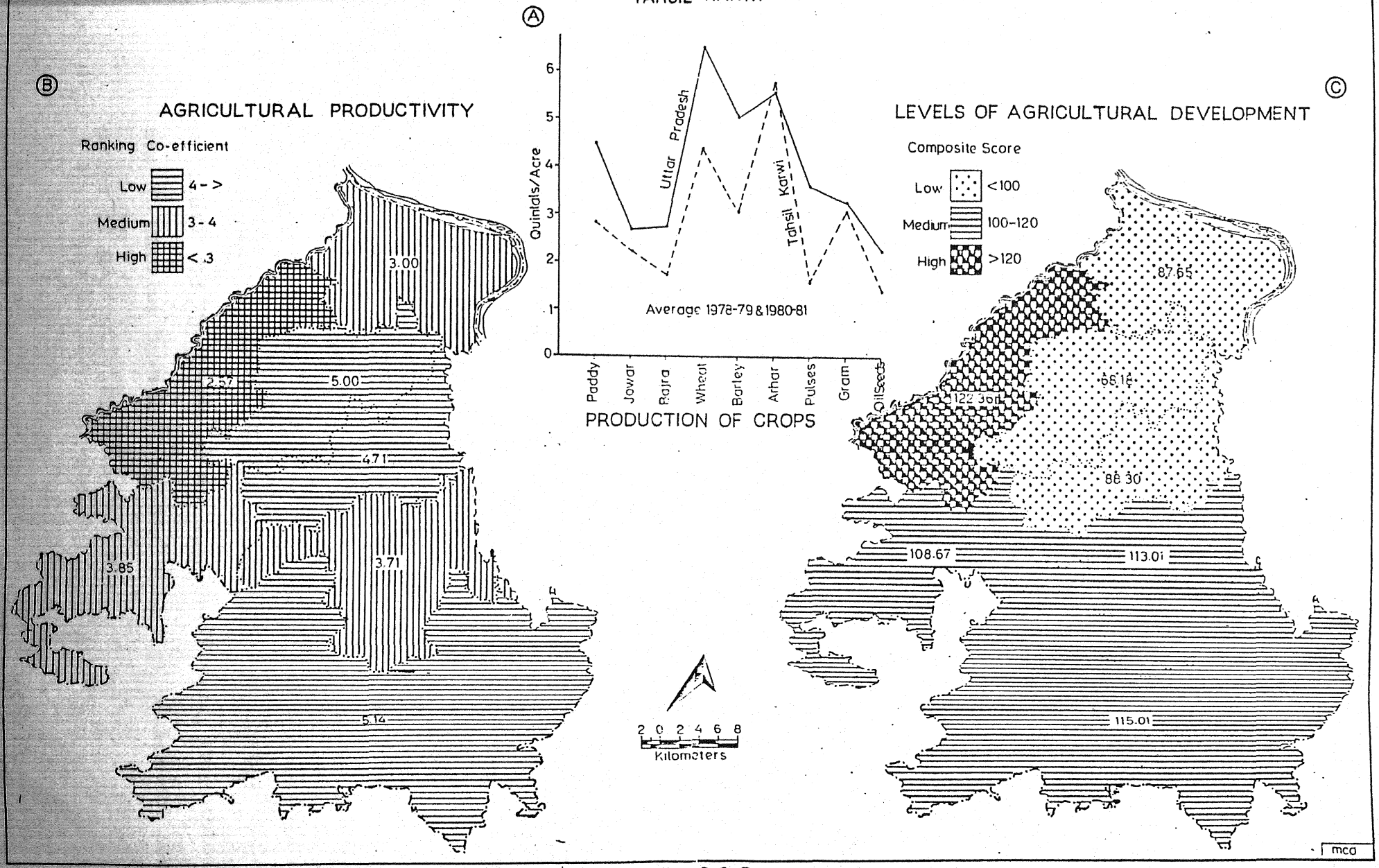

TAHSIL KARWI
A
B
AGRICULTURAL PRODUCTIVITY
Ranking Co-efficient
Low 4- >
Medium 3-4
High < 3
3.00
2.57
5.00
4.71
3.85
3.71
5.14
Quintals/Acre
Uttar Pradesh
Tahsil Karwi
Average 1978-79 & 1980-81
Paddy
Jowar
Bajra
Wheat
Barley
Arhar
Pulses
Gram
OilSeeds
PRODUCTION OF CROPS
C
LEVELS OF AGRICULTURAL DEVELOPMENT
Composite Score
Low <100
Medium 100-120
High >120
87.65
88.16
122.30
88.30
108.67
113.01
115.01
2 0 2 4 6 8
Kilometers
mca

FIG.NO. 3.5

concrete results.

The 'Ranking co-efficient Method' developed by Kendall[9] is a most common device to measure the agricultural productivity. Taking into account some shortcomings of Kendall's method, Bhatia[10] has suggested a method of compositing the per acre yield of different crops in a unit area to the yield of respective crops in the region. As the results derived from both method show close correspondence[11], the former has been preferred considering the fact that data for acreage of individual crops at village level are not available due to mixed cropping practices.

The ranking co-efficient for an areal unit is referred to as arithmetical average rank of different ranks given to the unit, based on per acre yield of different crops. It is obvious that a component areal unit with relatively high yield will have low ranking coefficient representing high agricultural productivity and vice-versa. Following the method, per acre yield[12] of main seven crops viz. Paddy, Jowar, Bajra, Wheat, Barley, Gram and Arhar, for each K. Circle have been ranked separately. The ranking co-efficient for each K. Circle has been obtained by dividing the composite rank by number of crops for respective circles. On the basis of ranking co-efficient, thus obtained, the K. Circles have been grouped into high, medium and low order of productivity (Fig. 3.5 B).

(i) The Areas of High Productivity - Parsaunja circle represents the areas of high productivity. The circle is well known for production of wheat, gram, jowar and arhar. The main factors for high productivity are good alluvial soil, availability of irrigational facilities and use of improved seeds and fertilizers.

(ii) The Areas of Medium Productivity - The medium productivity areas consist of Sardhua, Bhaunri and Karwi Circles. The main crops of the region are Jowar, bajra, gram and arhar.

(iii) The Area of Low Productivity - Nandi, Pahari and Manikpur circles jointly form the areas of low productivity. Wheat, gram paddy, jowar and arhar are the main crops of the region. The poor soil and low level of irrigational facilities are the main factors contributing the low productivity.

LEVELS OF AGRICULTURAL DEVELOPMENT

For the sound economic growth of a region, the role of agricultural development is decisive. Agricultural development implies maximum economic utilization of land and this means land has to be provided with adequate water and fertilizers, which, in conjunction with multi-cropping, lead to increased yield and income from land[13]. The agricultural development neither requires entire changes in the existing

pattern nor costly changes in morphological features of land. A better understanding of land forming processes and physical potential of the land is necessary in this regard.

The levels of agricultural development can be measured by both quantitative and qualitative indicators. The former indicates the increase in size and the latter implies the betterment of conditions of inputs and outputs. Similarly, at the given point of time the level of agricultural development would be revealed by the degree of advancement in the inputs and outputs in the region. Among various approaches developed for measurement of agricultural development, the selected indicators approach appears to be of special relevance. Scholars have put forward different typesof factors for assessing the agricultural development of an area but due to lack of appropriate data, we are constrained to use the following factors only, to measure the levels of agricultural development :-

(a) Irrigation,

(b) Multiple cropping,

(c) Use of agricultural implements and machinery,

(d) Use of fertilizers

(e) yield per acre.

A composite index based on above factors has been

computed for each K. Circle to display an over all indication of comparative levels of agricultural development applying the following methodology.

(a) Index of Irrigation -

$$Ii = \frac{\frac{\text{Irrigated area in the Unit area}}{\text{N.A.S. in the unit area}}}{\frac{\text{Irrigated area in whole region}}{\text{N.A.S. in the whole region}}} \times 100$$

(b) Index of Double Cropping -

$$Id = \frac{\frac{\text{Double cropped area in the unit area}}{\text{N.A.S. in the unit Area}}}{\frac{\text{Double cropped Area in the whole region}}{\text{N.A.S. in the whole region}}} \times 100$$

(c) Index of Mechanization -

$$Im = \frac{\frac{\text{Number of implements and machineries used in unit area}}{\text{N.A.S. in unit area}}}{\frac{\text{Number of implements and machineries used in the whole region}}{\text{N.A.S. in the whole region}}} \times 100$$

(d) Index of Fertilization -

$$If = \frac{\frac{\text{Fertilizers used in the unit area}}{\text{N.A.S. in the unit area}}}{\frac{\text{Fertilizers used in the whole region}}{\text{N.A.S. in the whole region,}}} \times 100$$

(e) Index of yield.

$$Iy = \frac{\text{Per acre yield in the unit area}}{\text{Per acre yield in the whole region}} \times 100$$

(N.A.S. stands for Net area sown)

(f) Composite Index for Agricultural Development -

$$CI = \frac{Ii + Id + Im + If + Iy}{5}$$

The composite index of agricultural development thus obtained has its value ranging between 68.18 in Pahari and 122.36 in Parsaunja circles (Table 3.4). On the basis of composite score, 3 levels of agricultural development have been decided (Fig. 3.5 C).

Table 3.4 : Indices of Agricultural Development

K. Circles	Index of Irrigation	Index of Double cropping	Index of Mechanization	Index of Fertilization	Index of yield	Composite index
Sardhua	105.60	76.81	74.57	67.16	114.11	87.15
Parsaunja	158.04	95.62	110.01	123.53	124.62	122.36
Pahari	30.76	85.51	85.87	55.28	84.08	68.18
Nandi	77.62	125.36	53.24	94.91	90.39	88.30
Karwi	106.99	98.55	125.73	116.02	96.09	108.67
Bhaunri	121.67	80.43	123.96	130.89	108.11	113.01
Manikpur	90.20	147.82	131.78	122.44	82.85	115.01

Animal Husbandry

Animals are regarded to be a real economic asset to man. In a predominantly agricultural region like the study area

where cattle are still the chief source of motive power for agricultural operations, a scientific system of animal husbandry is most essential. Animal husbandry in the region is most important economic activity next to crop husbandry but dairying, poultry and pig farming are the least developed and most neglected aspect of agriculture. Animal husbandry is mostly practised as a supplementary activity with agriculture on mixed farming basis in whole region while livestock rearing attains more significance in Patha area. The main handicaps in the advancement of livestock industry are not climatic vagaries, poor grazing and inadequate marketing facilities alone, but such fundamental ones as the poor genetic potentials of the existing stock, and acute shortage of feeds and fodders are just important[14].

LIVESTOCK COMPOSITION AND DISTRIBUTION

Livestock an integral part of agriculture consists of cows, bullocks, buffaloes, sheep, goats, pigs, loading animals and poultry. In 1982 the livestock population of the region was 364406. Table 3.5 and Fig. 3.6A present the composition and regional distribution of livestock resource.

Bovines

Bovine population includes cows, bullocks, and buffaloes which alone occupy a pivotal position in the total livestock economy. Bovines share 70.78% of total livestock population.

Table 3.5 : Distribution of Livestock Resource (1982-83)

K.Circles	Previous		Ovines		Poultry	Pigs	Loading Animals	Total
	Cows and bullocks	Buffa-loes	Goats	Sheep				
Sardhua	22616 (48.30)	7785 (16.62)	8150 (17.40)	2363 (5.05)	3787 (8.09)	1113 (2.38)	1014 (2.16)	46828
Parsaunja	29963 (55.08)	10595 (19.47)	7772 (14.29)	3585 (6.59)	1456 (2.68)	797 (1.46)	233 (0.43)	54401
Pahari	19622 (58.67)	6689 (20.00)	4396 (13.14)	615 (1.83)	1521 (4.55)	511 (1.53)	94 (0. 28)	33448
Nandi	18249 (54.15)	5103 (15.14)	4139 (12.28)	3192 (9.47)	2268 (6.73)	551 (1.63)	202 (0.60)	23704
Karwi	30619 (55.26)	12591 (22.72)	6273 (11.32)	3106 (5.60)	1926 (3.48)	677 (1.22)	219 (0.40)	55411
Bhaunri	32434 (53.30)	9956 (16.36)	12577 (20.67)	2582 (4.24)	2378 (3.91)	832 (1.37)	92 (0.15)	60851
Manikpur	35470 (52.44)	10631 (15.72)	12864 (19.02)	2180 (3.22)	5752 (8.51)	659 (0.97)	78 (0.12)	67634
Total Rural	188973 (53.64)	63350 (17.98)	56171 (15.95)	17623 (5.00)	19088 (5.42)	5140 (1.46)	1932 (0.55)	352277
Urban	4438 (36.59)	1154 (9.51)	2290 (18.88)	47 (0.39)	3558 (29.34)	558 (4.60)	84 (0.69)	12129
Total Tahsil	193411 (53.08)	64504 (17.70)	58461 (16.04)	17670 (4.85)	22646 (6.22)	5698 (1.56)	2016 (0.55)	364406

Note - Figures in parenthesis denote percentage to total livestock population.

Source - Unpublished Record Office of Tahsildar, Karwi (Banda).

The cow produces milk and calves. The milk is the main source of animal protein in the diet of predominantly vegetarian population. The bullocks are the principal source of motive force in agricultural operations. Cows and bullocks apportion 53.08% of total livestock population. The percentage distribution of cows and bullocks varies from 48.30 in Sardhua to 58.67 in Pahari circle. The areas having extensive grazing land and traditional cultivation possess the higher percentage of cows and bullocks.

Buffaloes, sharing 17.70% of total population also play an important role both as draught power and as milch stock. He-buffalo is slower than bullock, so it has not proved as useful as working animals, whereas she-buffalo is the main source of milk. The percentage of buffaloes is lower than cows and bullocks in the whole region and ranges between 22.72% in Karwi to 15.72% in Manikpur. The distribution of buffaloes is usually determined by the availability of fodder for stall feeding and demand of milk.

Ovines

In addition to bovines, there are 76131 ovines in the study area. The goat as a milch stock, is referred to as a cow of poor landless peasants. Besides milk, goat is a chief source of meat and cheap leather. It apportions 16.04% of total population. The urban areas possess higher percentage

(18.88) of goats than the rural areas. Middle and low class of urban dwellers prefer goat husbandry as it requires small space and low expenditure. Besides, they can easily thrive under stall fed condition. The areal percentage of goats varies 20.67% in Bhaunri to 11.32% in Karwi circle. Bhaunri, Manikpur and Sardhua circles are important for goat rearing due to availability of grazing facilities on cultivable waste and fallow land. Goat rearing is the main occupation in the villages adjoining hills, forests and scrubs.

Sheep contributing the farmers income, food and clothings, share 4.85% of total livestock population. They are the main source of wool and meat. As they can not withstand heavy rains, therefore, percentage of sheep to total livestock is higher in northern drier part than the southern counter part and ranges between 9.47% in Nandi to 1.83% in Pahari circle.

Poultry - Poultry consisting of fowls and ducks contribute 6.22% to total livestock population. The urban areas are marked with high percentage of poultry. Sardhua and Manikpur circles form the areas of higher percentage of poultry. As urban centres are the main consumer of poultry products, therefore, the percentage of poultry is higher in and around urban areas.

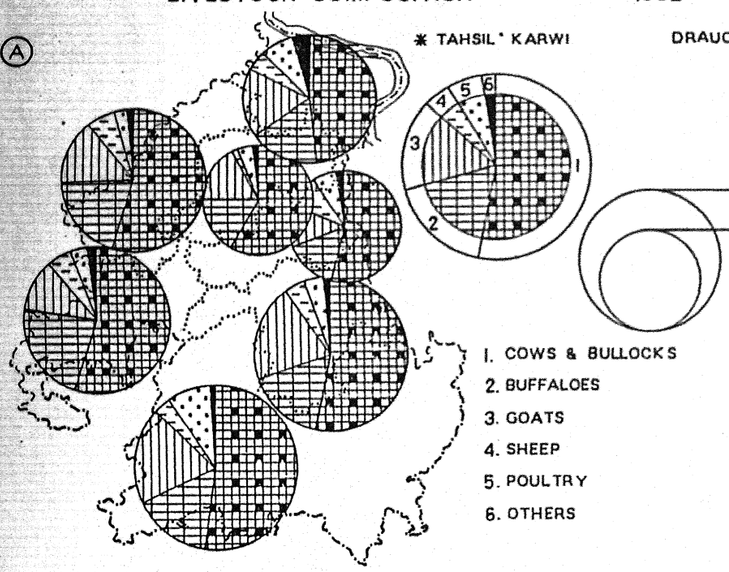
Pigs - Among domestic animals pigs are the most prolific breeders and quick growers. Pig shares only 1.56% to total

TAHSIL KARWI

LIVESTOCK RESOURCES

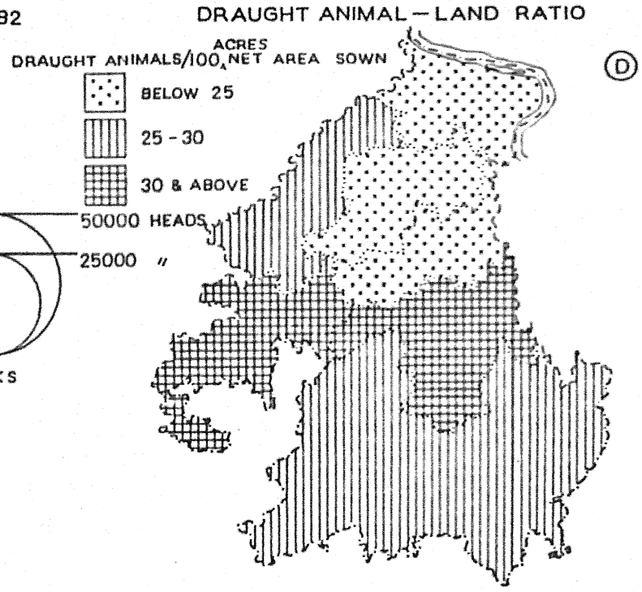
LIVESTOCK COMPOSITION 1982

(A)



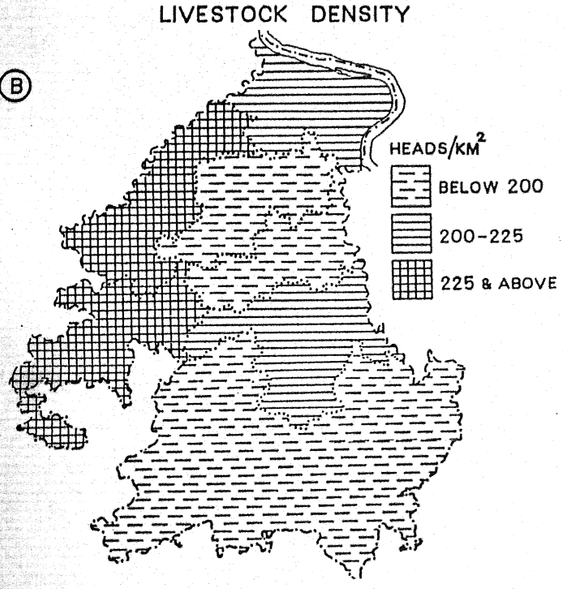
DRAUGHT ANIMAL – LAND RATIO

(D)



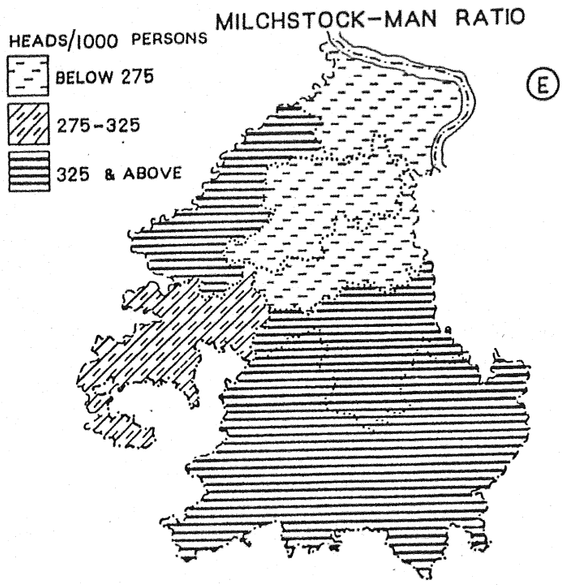
LIVESTOCK DENSITY

(B)



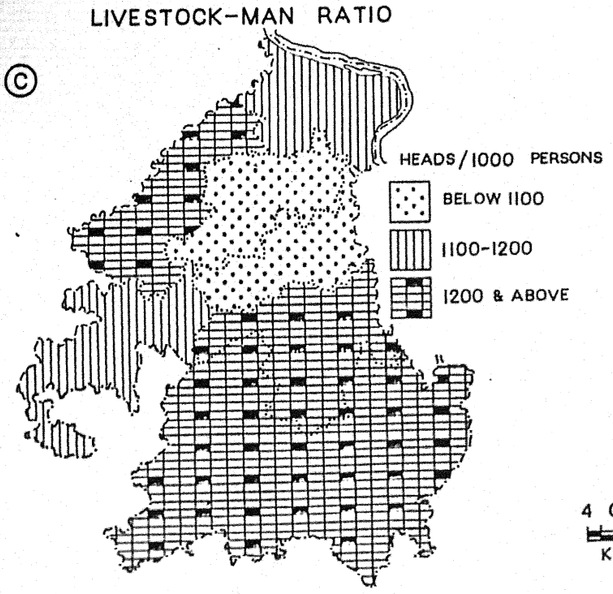
MILCHSTOCK–MAN RATIO

(E)



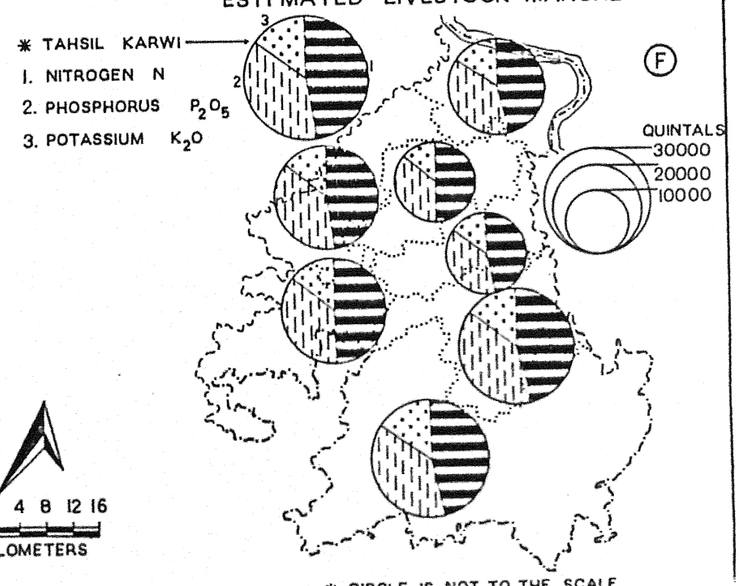
LIVESTOCK–MAN RATIO

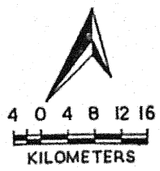
(C)



ESTIMATED LIVESTOCK MANURE

(F)





* CIRCLE IS NOT TO THE SCALE

mca

FIG.NO. 3.6

livestock population of the study region. The highest percentage of pig population is recorded in Sardhua followed by Nandi and Pahari circles. The urban areas have higher percentage of pig population (4.60) than that of rural areas (1.46).

Loading Animals - Camel, mule, horse and donkey, as loading animals contribute very low percentage to live stock population due to the fact that their utility is decreasing rapidly. Sardhua circle records highest percentage (2.16) of draught animals. The camels are kept only for transporting the farm produce or luggage.

LIVESTOCK AND LAND/MAN RELATIONSHIP

Livestock and land/man relationship is an important aspect of agriculture as well as animal husbandry and has been established as livestock density (heads/Km^2), livestock-man ratio (heads/1000 person draught animal land ratio (draught animals/100 acres of N.A.S.) and milch stock-man ratio (milch stock/1000 persons) in the present study (Table 3.6).

Livestock density

Livestock density in the region is 262 heads/Km^2 which is higher than that of the district figure (157 heads/Km^2). The density varies from 253 heads/Km^2 in Karwi circle to 86 heads/Km^2 in Manikpur circle. High livestock density

(Above 225) is observed in Karwi and Parsaunja circles whereas Pahari, Nandi and Manikpur circle present low density (below 200) (Fig. 3.6B).

Livestock-man ratio

The relation between man and animal resources has remain very close since past. Livestock-man ratio for the study area comes to 1062 which is higher than the district ratio (890). Manikpur circle, having 18.56% of total live stock population holds highest ratio and is followed by Parsaunja and Bhaunri circles while Pahari circle is marked with lowest ratio (Fig. 3.6C).

Table 3.6 : Livestock and Land/Man Ratio

K.Circles	Livestock density (Live-stock heads/Km^2)	Livestock man-land ratio (Livestock heads/1000 persons)	Draught animal land ratio (Draught animal 100 acre NAS)	Milch stock-man ratio (Milch-stock heads/1000 persons)
Sardhua	209	1112	23	212
Parsaunja	239	1270	28	342
Pahari	169	862	21	250
Nandi	188	1021	22	251
Karwi	253	1111	34	324
Bhaunri	208	1263	30	330
Manikpur	86	1330	29	337
Total Rural	165	1152	27	298
Urban	1166	324	-	61
Total Tahsil	1262	1062	27	272

Draught animal-land ratio

The cattle play a vital role in the agriculture by providing the necessary draught force for ploughing, harvesting, lifting water from wells and transporting, agricultural produce. All the cattle above the age of 3 years which are not reserved for milk and breeding are termed as draught animals numbering about 69 thousand. Bullocks are the main draught animals of the region and share 97.48% of total draught force.

Fig. 3.6D depicts the distribution of draught force in term of draught animal and land ratio on K. Circle level. The study area records lower draught ratio (27 heads/100 acres of N.A.S.) than that of the district average (57). The proportion of draught animal to net area sown is highest in Karwi circle (34) and is followed by Bhaunri (30) and Manikpur (29) circles.

Milch Stock-man ratio

In the study area cows and buffaloes are kept for milk production and breeding. Cows are more popular sharing 85.78% of total milch stock and reared by farmers for male progeny. As such buffaloes are an important source of milk supply yielding nearly two to three times more milk as cow. Goats are also good source of milk though average production from goats is very low. Milchstock-man ratio may be considered as health indicator of rural community.

Fig. 3.6E presents the distribution of milch stock (cow and buffaloes) on K.Circle level term of milch stock-man

ratio (milch stock/1000 persons). The study region attains higher ratio (272) than that of the district average (195). Parsaunja, Manikpur, Bhaunri and Karwi circles record high milch stock ratio whereas Sardhua exhibits low proportion. The highest milchstock ratio of Parsaunja circle is due to high availability of animal fodder as crop residuals for stall feeding.

LIVESTOCK PRODUCTS

Milk and meat are the main livestock products of the region. Other products from livestock are wool, skins, hides, bones etc. A number of industries based on animal products such as carpet, blanket, bone crushing, tanning etc. can be established in the study area. The average production of wool is about 0.75 Kg. per sheep per year[15]. In the study area, total per year production of wool is 13252 Kg. Besides, livestock helps in maintaining the fertility of soil by producing a large quantity of manures. As heavy fertilization continuing for a longer period is harmful for the chemical properties of the soil, manuring attains special significance. Cattle dung is important source of manure in rural areas. A large portion of dung is burnt as the domestic fuel. According to an estimate cattle refuse (including poultry) can provide 87928.56 quintals of nitrogen (N), 70042.52 quintals of phosphorus (P_2O_5) and 218013.40 quintals of potassium (K_2O)[16]. The distribution of estimated livestock

manure is presented in fig. 3.6F.

DAIRYING

Dairing, as subsidiary occupation in rural areas, not only helps in increasing the supply of milk in urban and rurban areas, but also plays as important role in rural development by catalising the economic growth. Although there is no specialized farm in dairying, the majority of farmers keep one or two milch stock according to their means, size of holdings and nature of farming.

The livestock statistics shows that area has ample number of cattle but the production of milk is extremely low as cows, buffaloes and goats usually produce 1 Kg., 1.5 Kg., and 0.5 Kg. milk per day respectively[17]. The major portion of milk is sold by villagers through disorganized agencies.

At present one dairy unit namely 'Dugdha Utpadak Sahkari Sangh' is working at Karwi for procuring, processing and chilling of milk with the capacity of 4000 litres per day. Milk procurement is being done through fifty milk producer's societies. The processed milk is supplied to consumers in the town locally. Surplus milk is supplied to Allahabad, Satna and Rewa urban centres of Madhya Pradesh. Table 3.7 presents the progress of milk procurement.

Table 3.7 : Milk Procurement by the Society

Year	Amount in litres	Average per day
1979	58630	176
1980	93273	255
1981	108424	296

Source - Office of the Manager/Assistant Project Officer, Karwi Dugdh Utpadak Sahkari Sangh Ltd.,Karwi.

POULTRY FARMING

Poultry farming is mainly a rural industry and plays an important role in the economic uplift of small and marginal farmers as a subsidiary occupation. It is intensive form of agricultural production in which nature of land plays a little part.

The population of poultry in the study area is 22646 birds. There are 28 poultry units established in the region. Besides, poultry birds are found everywhere though in small numbers. In the villages, the birds are maintained in small units without proper care about their feeding, housing, breeding and health. The laying capacity of the birds is also low. There is a wide scope to develop poultry farming by improving breeds, housing conditions and providing market facilities.

PIG HUSBANDRY

Pig husbandry, by tradition has been a subsidiary occupation of depressed class of the society. Pig meat has a great demand in the manufacturing of products like bacon and sausage. Pig husbandry can provide quick return with low investment. Though the number of pigs is considerably small (5698), there are 72 piggery units in the study area. As piggery demands little land, it can be developed as a secondary occupation for depressed group of the society to strengthen their economic base by providing breeding and feeding facilities.

FISHERIES

The term fishery includes not only the business of catching the fish in ordinary sense but also includes the development, preservation and nutritional programme for the increasing of fish culture. In the area which is not able to sustain population pressure, the development of fishing and pisciculture may be one of the most important source of income as well as protein and vitamins rich food. Main fish available in the region are Rohu, Parhina, Nain, Sirhana and Katla etc.

Area Under Pisciculture

At present fisheries and irrigation department of the State are engaged in the development of pisciculture

in the study area. It is being practised in tanks, ponds, bundhies and reservoirs constructed for irrigation but water bodies, so for, managed by State Government are few. Besides, the rivers like the Yamuna, the Baghain and the Paisuni provide natural water course for fishing.

Total recorded area under pisciculture is 2397 hectare which includes reservoirs, tanks and bundhies (Table 3.8). In addition to above, there are some tanks of Gram Samaj such as Saraiyan tank, Sakrauhan tank, Khiddi tank, Unchadeeh tank and Chureh Kesarua tank in Manikpur circle in which fish culture is practised. Two fish farm located at Kaloopur and Barua are engaged in the production of fish seed by induced breeding technique and distribution to fishers for private tanks.

Table No. 3.8 : Area under Pisciculture

Name of Reservoir/Tank	Area in Hectare
1. Barua Reservoir	1154
2. Ohan Reservoir	890
3. Hela Reservoir	85
4. Manikpur Bundhi	81
5. Jarera Bundhi	83
6. Rampur Bundhi	104
Total	2397

Source - Office of the Assistant Director (Fisheries) Banda.

Potential Area - It has been observed that resources of village ponds and tanks have been largely neglected, therefore, for the intensive fish culture, the survey of the tanks of Karwi tahsil has been made by Fisheries department. Survey reports that there are 526 tanks in the area of which only 18 are under private ownership, extending over 704.73 hectares. Out of which 139.41 hectares area of 65 tanks can be directly used for fish culture and remaining tanks require some improvements. The improvement cost has been estimated to Rs. 105 Lakh[18].

Production - The average fish production (1977-78 to 1981-82) is 123.5 quintals and it provides Rs.81,206.15 as revenue to the Government. Table 3.9 shows the yearly fish production and revenue received.

Table 3.9 : Production of Fish and Revenue

Year	Production (Quintals)	Revenue (Rs.)
1977-78	118.85	36,639.21
1978-79	108.20	52,896.00
1979-80	125.78	63,886.01
1980-81	63.21	84,503.26
1981-82	203.11	1,68,106.30

Source - Office of the Asstt. Director of Fisheries, Banda.

It is clear from the above study that fish culture is gradually being developed and there is ample scope for fishing and pisciculture.

Mining

Minerals are not only the base of industrialization but also have a significant role in the economic development of an area. Although the study area is enriched with mineral resources yet it is insignificant in the mineral map of the State.

DISTRIBUTION AND PRODUCTION OF MINERALS

The important minerals of the study area are bauxite, ochre, silica sand, clay, granite and building stones etc. Fig. 3.7A depicts the distribution of minerals in the area under study.

Bauxite

Bauxite, the principal and commercial source of aluminium, contains hydrated aluminium oxide. It is a secondary mineral derived by chemical decomposition of aluminium bearing rocks such as granite, syenite, diorite and gneiss. Bauxite, occuring in area is generally dirty white to creamish white in colour. However, different shades of ash grey, pink and brown are also common.

Deposits - The occurrence of bauxite with laterite, clay and ochre was discovered by Directorate of Geology and Mining, U.P. in 1965. This was followed by a systematic investigation and search for bauxite deposits by the Directorate during the year 1967-68 which proved to be quite successful[19]. The deposits of bauxite occure in a residual profile over upper Vindhyan Rewa sandstone on 365 meters high plateau. The area, situated in the Rajauhan forest block of Manikpur forest range, is accessible from Manikpur through 25 Kms forest road in fair weather.

Rajauhan mines cover about 5 Km^2 area of three hills i.e. Turkaha, Masax Hara and Chohia. The minerals are also noted in the number of adjoining hills. Table 3.10 presents estimated reserves of bauxite in Rajauhan mines.

Table 3.10 : Bauxite Reserves

Sl.No.	Name of Hills	Reserves (in Million tons)
1.	Turkaha Hill	4.620
2.	Masax Hara Hill	2.326
3.	Chohia Hill	1.380
	Total	8.326

Source - Office of the Director, Geology and Mining, U.P., Lucknow.

The gradewise distribution of reserves shows that out of 8.326 million tons of total reserves, 58.62% and 41.38% are shared by aluminium laterite and bauxite respectively. The reserves of Masax Hara hill are of poor quality.

Production - The production of bauxite was started in 1968-69 under the hand of a private company. In the year 1975, U.P. State Mining Development Corporation took the management and started production in 1977. The bauxite production in the area exhibits a flactuated trend (Table 3.11). The production is exported to mainly Hindustan Aluminium Company, Renukut and Bharat Aluminium Company Corba.

Table 3.11 : Production of Bauxite

Years	Production (Metric Tons)
1977-78	7735
1978-79	19070
1979-80	4594
1980-81	N.A.
1981-82	18849

Source - Office of the Assistant Engineer (Mining), U.P. State Mining Development Corporation, Manikpur.

Diamond

It is much precious stone which is rarely found. The

occurrence of diamond containing ores are expected in Rukma village near Mara Dam (Manikpur area) but further investigation is required.

Limestone

Deposits of lime stone have been reported in Mamania, Nihi and Chauri forest blocks from which high grade limestone can be obtained. But due to availability of cheap lime from Satna, its production is not economic. Some mines are located in Kolgadahia and Khohi in Chitrakoot area but their deposits have been finished. The Chalk deposits are also reported in Donda forest block of Markundi range.

Dolomite

Limestone with more than 10% magnesium carbonate ($MgCO_3$) is called dolomite. The mineral deposits are located in Khoh village in the south-western part of Gadwa nala. The thickness of the deposits varies from 19.8 meters to 56.8 meters. Estimated reserves in Rehuntia and Kolgadahia villages are about 71 Lakh tons[20].

Feldspar

It is basic raw material for making porcelain articles. The feldspar deposits are concentrated in Bharatkoop area which needs economic exploitation.

Ochre

The term ochre is applied to the soft and massive varieties of haematite (Fe_2O_3) named as red ochre and limonite ($2Fe_2O_3\ 3H_2O$) named as yellow ochre[21]. The mineral is used for wall painting and varnish manufacturing. The ochre deposits are found in Ranipur, Deori and Rajauhan forest blocks of Manikpur range and Donda block of Markundi range. The estimated reserves of ochre are 15 to 20 thousand tons[22]. The mining and production of ochre is under the control of forest department.

China Clay

The mineral is used for manufacturing of insulators, articles of domestic use and sanitary wares. China clay is found in Majhwaha hills in south of Sikaria village. Another deposit occures in the south of Lakhanpur village at the distance of 7.2 Kms from Tikaria railway station. The estimated reserves of Majhwaha hill and Lakhanpur village at the distance of 7.2 Kms from Tikaria railway station. The estimated reserves of Majhwaha hill and Lakhanpur village are 65000 and 1,00,000 tons respectively[23].

Granite

Granite is a hard stone which is found in the southern part of the region in enormous quantity. Bharatkoop, Khoh,

Rehuntia, Semaria and Manikpur are the main areas of granite quarrying. In Bharatkoop, Sheorampur and Karwi area, stone crushers use granite as a raw material for making grits. It is used for the construction of buildings, roads and railway tracks.

Building Stone

Building stones are commonly found in the area of Bharatkoop, Sheorampur, Bhaunri, Khoh and Sitapur. The slabs of building stones are made by local labour. The labourers are engaged in the cutting stones and giving different shapes as pillars, squares, and rectangulars.

Sand Including Coarse Sand

Sand and coarse sand (murram) are found in rivers (especially in the Baghain) of the study area. It is used for construction work and cement pipe industry.

Although study area possesses considerable amount and variety of minerals yet the prospects of mineral production are limited due to inadequacy of transport facilities, under developed mining operation and lack of investigation. In fact, significance of mining activities in the economic development of the study area is negligible. To assure the contribution of mining in the regional economy, a number of small and medium scale industries should be established.

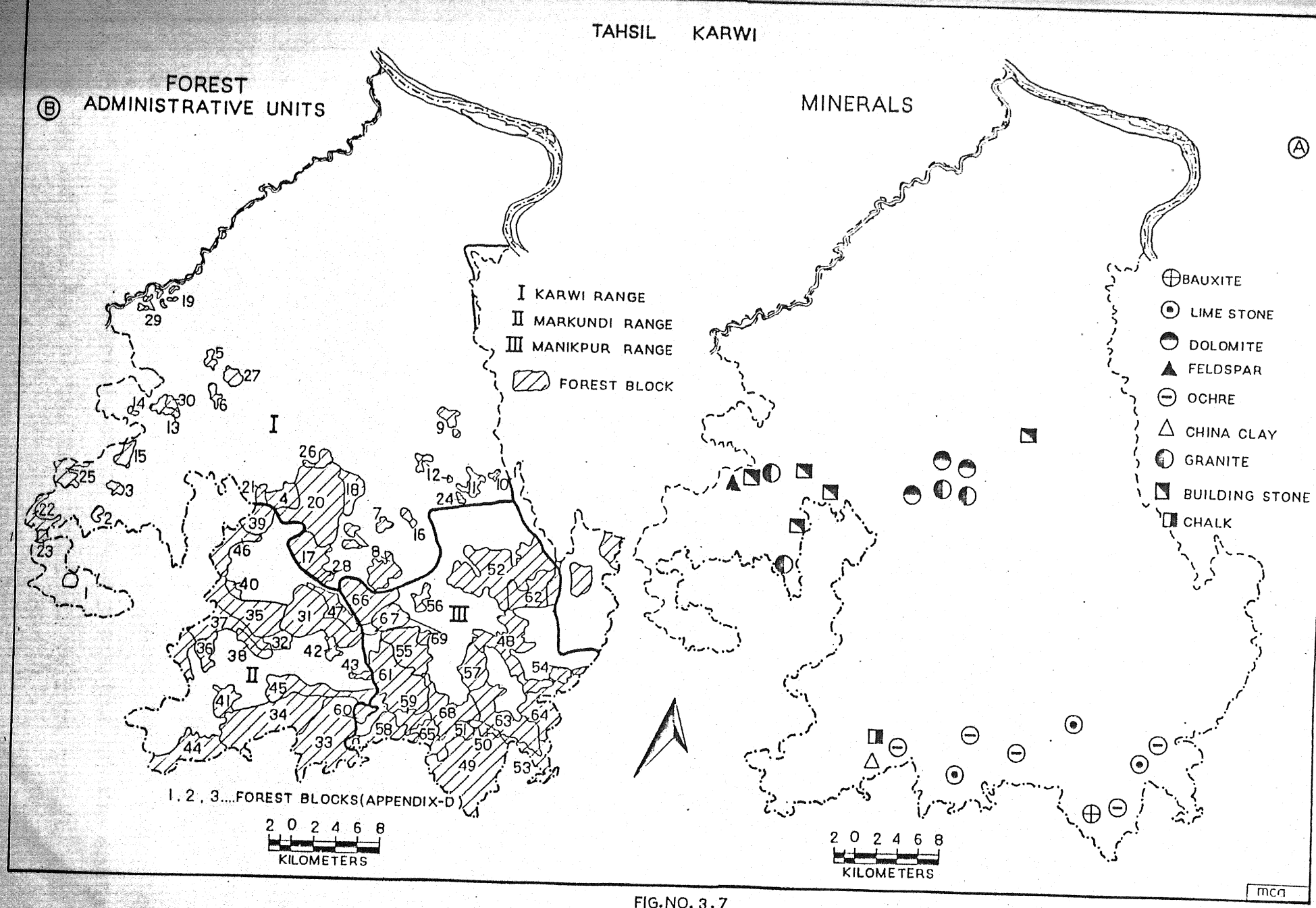

TAHSIL KARWI
FOREST
ADMINISTRATIVE UNITS
B
I KARWI RANGE
II MARKUNDI RANGE
III MANIKPUR RANGE
FOREST BLOCK
I, 2, 3....FOREST BLOCKS(APPENDIX-D)
2 0 2 4 6 8
KILOMETERS
MINERALS
A
BAUXITE
LIME STONE
DOLOMITE
FELDSPAR
OCHRE
CHINA CLAY
GRANITE
BUILDING STONE
CHALK
2 0 2 4 6 8
KILOMETERS
mcn

FIG.NO. 3.7

Forestry

Forestry has been defined as the theory and practice of scientific management of forests including their creation when necessary, for the continuous provision of produce and services[24]. The importance of forests has been known to man since time immemorial as they perform two important functions i.e. protection and production. The protection offered by forests consists of the restoration of ecological balance, the preservation of physical properties of land and to check the soil erosion. As a productive agent, forests supply a variety of commercially important goods such as timber, firewood and industrial raw material. Nevertheless, they are habitat of wild life, medicinal plants and provide scope for recreation and sports.

In the study area, forest provides direct profit to the people through the selling of some products such as mahua fruits, firewood, 'chironji' and wood for preparing agricultural implements and building materials. The forests are also a good source of fodder for animals. Besides, they are the source of livelihood for the weaker section of the society by providing direct employment in different economic activities of forest exploitation and utilization. In the slack months of agricultural activities people engage themselves in lumbering, collection and transportation of forest products. In the months of May and June most of the Kols pluck and collect tendu leaves on contract basis.

TYPES OF FORESTS

Although the physical factors like climate and soil are not favourable for the luxuriant growth of natural vegetation yet southern upland part of the study area is covered with forests. The forests are comparatively open and height of trees is generally low.

Forests of the study area have been classified into two categories i.e. reserved and unclassified forests, for their planning and management. The reserve forests are generally confined in the hilly areas and are characterised by comparatively thick growth of vegetation and produce good quality of timber while unclassified forests have sparse growth and are used for fire wood and cattle grazing. The forests area is administered under three forest ranges with headquarters at Karwi, Manikpur and Markundi having 30, 22 and 17 forest blocks respectively (Fig. 3.7B and Appendix D). Kota Kandaila and parts of Chauri and Desah forest block of Bargarh range fall in the study area whereas a few blocks of Karwi range are situated beyond tahsil boundary. But with due consideration of data available, aforesaid fact has been ignored while dealing with distribution and production of the forests.

The classification of forests of the study area, as shown in table 3.12 is based on Champion and Seth's classification[25].

DISTRIBUTION OF FORESTS

The forests (governed by forest department) of the study area account for about 24% of total geographical area. The northern part of the study area, being agricultural plain, is occasionally dotted with forests patches while the southern part is covered with forests.

Moist Peninsular Valley Forests

The forest is extended over 79.23 hectares area in Mamania

Table 3.12 : Distribution of Forests (Area in hect.)

Forest Type	Markundi Range	Karwi Range	Manikpur Range
1. Moist Peninsular Valley Sal Forest	79.23	-	-
2. Tropical Forest Along River Bank	99.33	23.00	-
3. Northern Dry Mixed Deciduous Forest	17618.85	10399.80	19148.21
4. Dry Deciduous Scrubs	1702,07	1683.56	1863.20
5. Dry Grass Forest	271.55	40.00	1114.30
6. Euphorbia Scrubs	8.50	13.00	8.00
7. Karghai Forest	-	202.40	12.00
8. Salai Forest	131.12	325.85	257.00
9. Dry Bamboo Forest	412.24	304.21	859.99
10. Ravine Thorny Forest	-	369.43	-
11. Planted Forest	-	341.78	1352.60
Total	20322.89	13703.03	24615.30

Source - Banda Forest Division - Action Plan Circle I, U.P. 1974-75, 1978-79, 1983-84.

forest block of Markundi range in the valley of perennial water streams forming narrow strips. The area possesses loamy soil of considerable depth formed by weathering of granular rocks. Sal trees are generally found in scattered pattern and somewhere form 60 to 70 meters thick belts. The other species, grown with Sal, share negligible proportion.

Forests Along the River Banks

Covering an area of 122.33 hectares, these forests are found along the river banks and water courses in Markundi and Karwi ranges. Due to suitable condition of soil and water, these forests are exuberant in growth in comparision to northern dry mixed deciduous forests. The main species are Katha-Jamun, Tendu, Gular, Khirni etc.

Northern Dry Mixed Deciduous Forests

These forests cover the largest area (47166.86 hectares) ~~in ares)~~ in all three ranges consisting of most of the species found in the region. In some areas Karghai, Kair and on hills Salai are grown in non mixed form. Main deciduous species of the region are Ghont, Dhava, Khair, Tendu, Duddhi, Gurja, Amla and Mahua. Besides, Achar, Sandan, Semal, Kulloo and Bel are also found in scattered form.

Dry Deciduous Scrubs

These forests are found in all ranges in the vicinity of settlements covering an area of 5248.83 hectares. The

forests are badly affected by irregular cutting. The main species grown in the region are Reunjha, Khair, Ghont, Duddhi, Dhak, Neem etc. Karaunda and Ghawai are principal under-growth species.

Dry Grass Forests

These forests, characterised with low density of trees, are mainly grass forests and occupy 1425.85 hectares area. Among trees Tendu, Senja and Khair and among under-growth Jharberi and Karaunda are common, Mussel and Parwa are the main grasses of the forests. These forests are distributed in the forest blocks of Manikpur and Markundi ranges.

Eupthorbia Scrubs

Euphorbia scrubs occupy the Vindhyan hills and upland slopes especially in Chandramara forest block. In addition to scrubs, Gabdi Ghont and Jharberi and common species.

Karghai Forests

Karghai is the main species of the Marwari and Dhaurhara blocks of Manikpur range. Balmiki and Marwari block possess the luxuriant growth, being protected by illegal cutting and grazing. In some areas due to extensive grazing, the Karghai forests have been converted into stunted scrubs.

Salai Forest

Salai forest is extended over 713.97 hectares on sandy loam soils, obtained from weathering of laterite and shale. The growth of the forest is visualised on the upland slopes and escarpments. In Matdar, Shitalpur, Dadari and Donda blocks, Salai possesses luxuriant growth.

Dry Bamboo Forests

Baomboos grow on quartz ridges, gneiss hills and escarpments of Vindhyan plateau, covering an area of 1576.44 hectares. It is also found in scattered form in the whole region. Kolhuwa and Rajauhan blocks are well noted for dense and good variety of bamboos.

Ravine Thorny Forests

These forests are common in ravine land of the Yamuna, the Baghain and the Paisuni rivers. Main species are Reunja and Kataiya. Besides, Babul and Kaitha are also found. Among low-growth species Karaunda, Jharberi, Kareel and among grasses Parwa and Kush are common.

Planted Forests

1694.38 hectares area of Karwi and Manikpur ranges is under planted forests of Teak (Sagaun). Besides Deori, Rajauhan, Nahra, Dhaurahara blocks of Manikpur range and

Chauri block of Markundi range, Sagaun trees are found in scattered form.

FOREST PRODUCTS

Main forest products of the study area are timber, fuelwood charcoal, Khair, bamboo, tendu leave etc. Table 3.13 presents the yearly distribution of major forest products.

Table 3.13 : Major Forest Products

Products	Year		
	1978-79	1979-80	1980-81
Timber (M^3)	720.6	2121.09	1619.55
Seharu (Pieces)	76025	37200	26000
Koro (Pieces)	1127	4725	685
Bamboo (Pieces)	128185	201995	-
Fuel Wood (M^3)	4430	28959	8789.5
Charcoal (Kgs)	1000	97600	16500
Kattha (Kgs)	2820	164.04	-

Source - Deputy Conservator of Forest Office, Banda.

Miscellaneous Timber

The timber found in the area is not so good as in

in Himalayan and Tarai region. Teak is most valuable timber but available in small quantity. Other important timber trees are Salai, Sanchar, Gurja, Gabdi, Thuar etc. As large size species are rare, only small size timber in forms of sanchar, balli, seharu and koro are available. These are the trunks and branches of trees of varying length and diameter. Salai and Gurja are used for making wooden packing cases while Duddhi is raw material of wooden toys. Babul provides excellent timber for agricultural implements.

Fuel Wood

Excluding Salai, Gurja and Gabdi mostly all the species are used as fuels. Manikpur circle ranks first in production of fuel wood Babul, jamun and sal are good fuel wood due to its high calorific value. Other fuel wood species are Ghont, Karghai, Amla, Senja, Ber etc.

Kattha (Khair)

Kattha is prepared from heart wood of Khair tree (Khair lari) which is found in abundant quantity in the area. (10-20 M^3 lari produces 250 grams Kattha).

Bamboo

Manikpur circle records the highest production of bamboo but its local demand is very low. Almost all the production is exported to Kanpur, Allahabad, Delhi, Chandausi, Agra and Aligarh.

Tendu Leaves

Tendu leaves are used in manufacturing of sheaths of biri and fetch a handsome revenue. Although tendu leave collection is a seasonal process yet it is of great importance to landless people. Very small quantity of tendu leaves is used in Manikpur. The major portion of the product is supplied to biri manufacturing centres such as Allahabad, Jabalpur and Satna. Table 3.14 shows rangewise progress in the production and revenue received from tendu leaves.

Table 3.14 : Tendu Leaves - Production and Revenue

Range	1979		1980		1981	
	Production	Revenue	Production	Revenue	Production	Revenue
1. Karwi	20.88	15.58	16.83	12.44	25.18	18.42
2. Manikpur	10.77	7.31	7.29	4.81	12.41	8.56
3. Markundi	9.83	7.08	10.10	4.53	11.56	7.93

Production in Thousand Standard Bags (One Standard Bag = Fifty Thousand leaves).

Revenue in Lakh Rupees.

Source - Divisional Forest Office, Banda District.

Other Minor Products

Other minor forest products are gum, honey, wax, amla,

harra, bahera, chironji, mahua etc. Harra is used for manufacturing of medicines and in Tannery. Mahua flowers are used as food by tribal people and their cattle and seeds are used as raw material in soap industry. Besides, grasses for animal fodder are also obtained from forest though in small quantity.

AFFORESTATION

Afforestation is being practised in the study area in two ways (i) plantation in forest blocks, (ii) plantation along road side. In the forest blocks where due to heavy irregular cuttings and grazing forest resource is in deplorating stage and soil erosion is active, plantation of trees is in progress. Main roads under taken by forest department for plantation are Karwi-Rajapur, Bhaunri-Raipura, Saraiyan Rajapur and Khoh-Bhaunri. Eucalyptus is the main species for road side plantation. Other auspicious species for afforestation are Khair, Shisham, Babul, Neem, Mahua etc. Table 3.15 presents the progress of afforestation in the study area. Due to increasing demand of fuel wood and rapid depletion of forests, efforts are being made to bring the additional acreage under the scheme of social forestry and farmland forestry. The barren and uncultivated land of gram sabhas has been planted with fuel wood plants by forest department. In the Karwi range, 100 hectares area has been selected for social forestry.

Table 3.15 : Progress in Plantation

Year	Forest Block Plantation (in hectare)	Road side Plantation (in line Kms)
1979	480	70
1980	260	120
1981	566	77

Source : Divisional Forest Office, Banda District.

Industry

Integrated area development includes not only agriculture but also decentralized industries to provide work for agricultural labourers, small and marginal farmers and others[26], Industrialization is a part of much broader processes of economic development which involves to raise the standard of living through a steady increase in the factors of production. Although the area is enriched with mineral and forest resources which could provide ample raw material to number of industries yet it is industrially backward. Before presenting the strategy for integrated area development it is, therefore, essential to assess the role of industrial activity in the existing economic status of the area under study.

INDUSTRIAL STRUCTURE

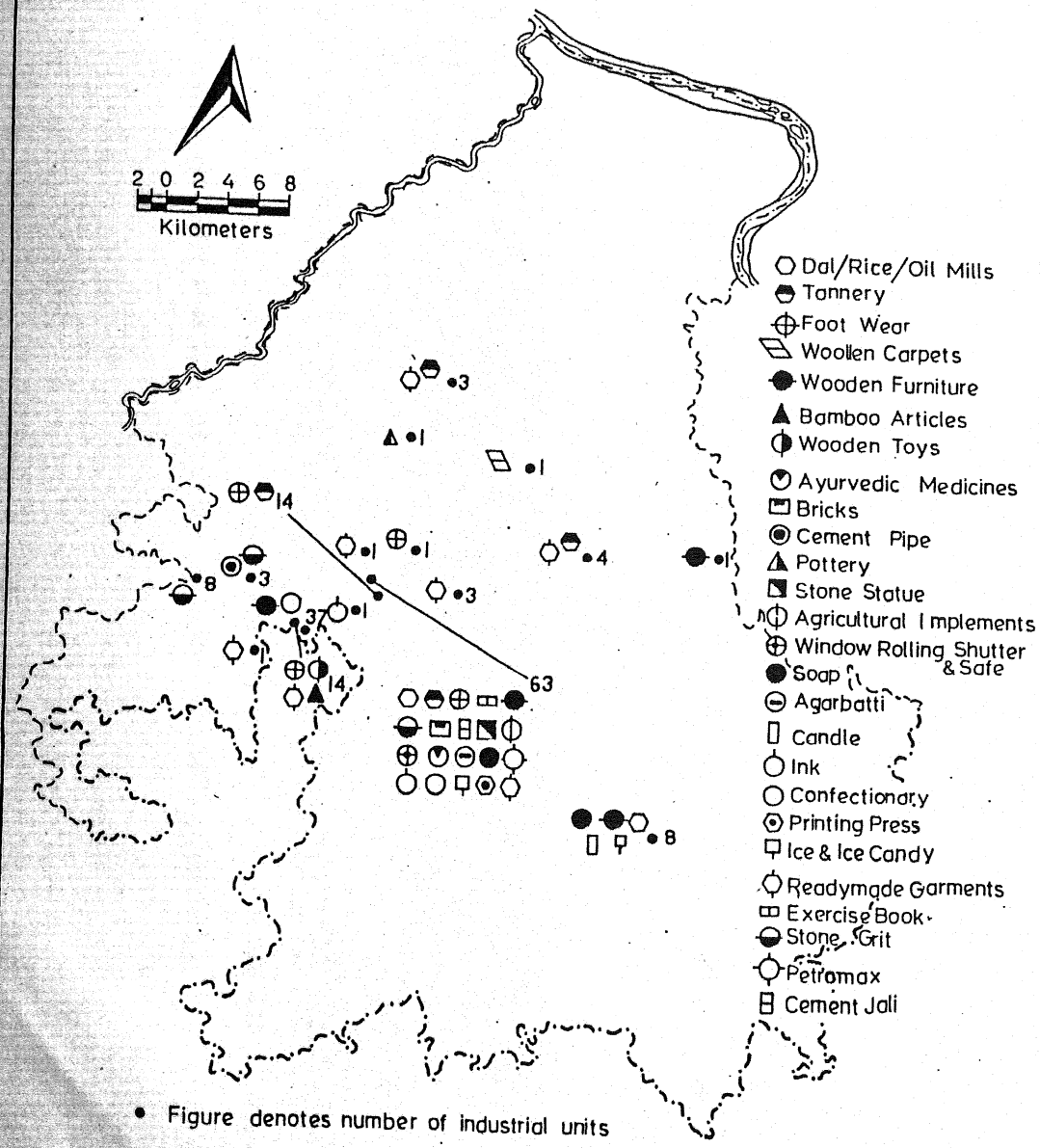
The existing industrial establishments are generally the small scale and household industries based on local raw material. There is no industrial unit registered under factory act 1948. The availability of local raw material and cheap labour enhanced the pace of industrial development in the study area. There are 165 industrial units of which 76 units are registered in the district industrial office.

History of industrial development begins with the establishment of a registered industrial unit of stone carving at Karwi in 1965. Following the trend of abrupt growth, the industrial units grew upto 76 in 1982, Fig. 3.8B. With over Rs.20 lakh capital investment these units secure an annual production of more than Rs. 35 Lakh. In addition to the above, a number of household and cottage industries fulfilling the local demands and needs, are scattered over the region.

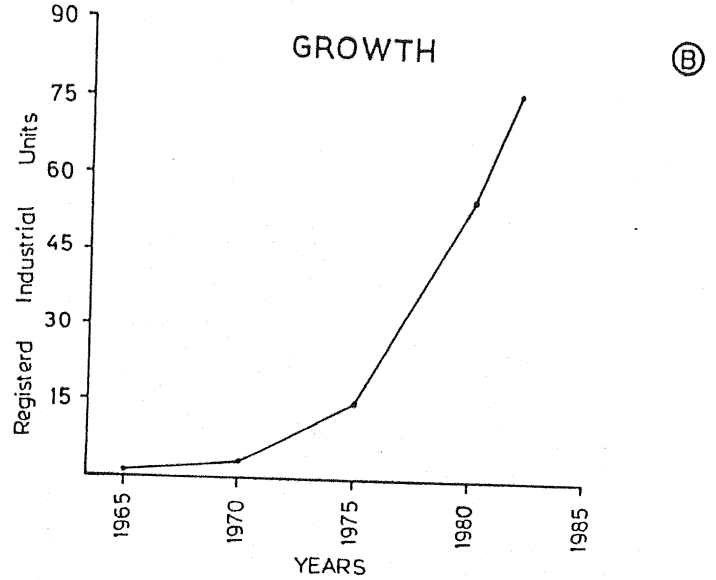
Industries of the area under study have been classified on the basis of raw material used. Table 3.16 shows the different types of industries with capital invested and annual production. Forest based industries share highest percentage (36.97) and is followed by mineral based (20%) and livestock based (16.97) and is followed by mineral based (20%) and livestock based (16.97). Metal based

TAHSIL KARWI
INDUSTRIES

Ⓐ DISTRIBUTION



Ⓑ GROWTH



Ⓒ STRUCTURE & EMPLOYMENT

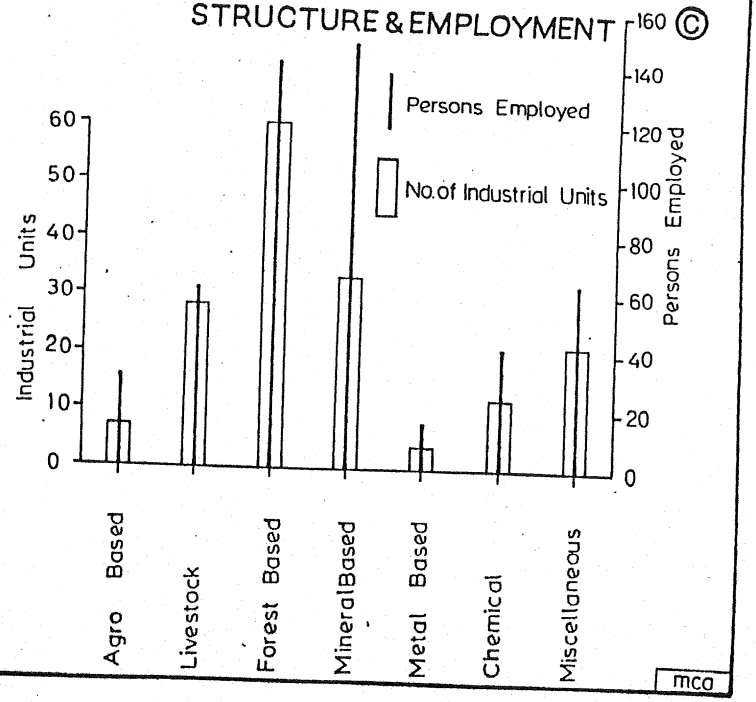


FIG.NO. 3.8

industries constitute lowest percentage (2.42).

Table 3.16 : Industrial Structure

Types of Industries	No. of Units			Capital invested (Lakh in Rs.)	Annual Production (Lakh Rs.)
	Total	Registered	Unregistered		
1. Agro Based	7	6	2	4.46	4.37
2. Livestock Based	28	1	27	0.84	5.23
3. Forest Based	61	30	31	2.28	4.48
4. Mineral Based	33	16	17	9.42	14.81
5. Metal Based	4	4	-	0.22	N.A.
6. Chemical Based	11	9	2	0.86	2.87
7. Miscellaneous	21	10	11	2.01	3.27
Total	165	76	89	20.09	35.03

Source = District Industrial Office, Banda.

SPATIAL DISTRIBUTION OF INDUSTRIES

Distribution pattern of industries exhibits a trend of concentration. Out of total 165 industrial units 63 units are located in Karwi proper. Fig. 3.8A depicts the distributional pattern of industries as well as industrial centres.

Agro-Based Industries

The agro-based industries comprising of dal, oil and rice mills are located in the urban centres of Karwi and Manikpur. Local production of pulses especially gram and arhar is the main source of raw material. These industries are seasonal in character. After meeting the local demand, surplus production is exported to Allahabad Kanpur and other commercial centres of the State. Main dal mills of the area are M/s Bundelkhand Dal Mill and M/s Sharda Dall Mill, Karwi, having annual production of Rs. 1.25 and 1.30 Lakh respectively.

Besides, a number of ata chakkis, oil expeller and rice hullers are functioning in meeting the demand of local people.

Livestock Based Industries

Livestock resources of the region provide hides, skins, bones, wool and bristles in sufficient quantity as a raw material for concenring industries. But very small portion of these products is used in local industries. The surplus material is exported to Agra, Kanpur and Unnao. Om carpet Industry of Semarwar (Nandi) is the only registered industrial unit based on livestock resources with capital investment and production capacity of Rs.0.03 Lakh and Rs.0.40 Lakh respectively. Other livestock based industries are shoe making and tanning, (22 units) established at Karwi, Karwi Muafi, Sitapur, Pahari, Bhaunri, Raipura, Manikpur, Sardhua and

Audaha. Shoe and Chappal making is also developed in the region as a household and cottage industry.

Forest Based Industries

Forest resources have not been properly utilized in the industrial development of the region. Wooden toys manufacturing industries (39 units) are concentrated in Chitrakoot. The raw material for the industry, available in nearby forest is soft wood of Duddhi, Semal and Sundari. The annual production of the industry is Rs.2.90 lakh against capital investment of Rs. 1.01 lakh. These units are using power driven motors and polishing aids. The manufactured toys are main attraction of the tourists and pilgrims visiting Chitrakoot. In Karwi, a pharmacy based on forest products is engaged in manufacturing the Ayurvedic medicines. Other forest based industries are wooden furniture and bamboo articles manufacturing units. In Manikpur, household industries of biri and khair making are located but these are not recorded in the district industrial office.

In addition to above, there are number of units engaged in the manufacturing of carts, doors and other domestic articles for local use. The cottage and household industries are managed by village artisans.

Mineral Based Industries

Stone crushing is the main mineral based industry based on locally available granite stone. There are eleven stone

crusher units situated in Bharatkoop, Sheorampur and Karwi, The capital investment and annual production in crusher industries are Rs. 6.33 lakh and Rs. 4.80 lakh respectively. A cement pipe manufacturing industry is working at Sheorampur with a capital investment of Rs. 2.63 lakh. The industry secures an annual production of Rs. 6 lakh. Other mineral based industries are pottery, cement jali and bricks manufacturing. Handicraft industries (18 units) based on locally available stone are established in Karwi. These units, producing stone statues and domestic articles, earn Rs. 3.29 lakh against very small (0.13 Lakh) capital investment.

Besides, there are considerable number of earthen pots and tiles manufacturing industries. These units are organised by village artisans as household industries.

Metal Based Industries

Metal based industries consist of manufacturing of agricultural implements (1 unit), rolling shutters, safes, almirahs, windows etc. (3 units). The products of the industries are consumed locally.

Chemical Based Industries

These are local demand based industries and consist of agarbatti, soap, candle, ink manufacturing and cloth

printing. Soap making is the largest chemical based industry with 6 industrial units located at Karwi and Manikpur. The capital investment and annual production of soap making industry are Rs. 0.53 lakh and 1.00 lakh respectively.

Miscellaneous Industries

The largest among miscellaneous industries is readymade garments making. There are 10 units of readymade garments working with capital investment of Rs. 0.45 lakh. Other industries of this group are ice candy (2 units), printing press (4 units) and exercise book manufacturing (2 units). Most of the industries are located in the Karwi, the largest urban centre providing markets to the products of these industries.

Tourist Industry

Chitrakoot is only pilgrim and tourist centre of the study area. In every month, on the day of new moon fair is held. Increasing number of visitors creates jobs for local people such as craftmen, shopkeepers, taxi drivers, rickshaw puller and hoteliers. Among the visitors, more than 90% people are Indians. Tourist development corporation and Jaipuria trust have extended lodging and fooding facilities to the visitors. Besides, there are number of dharamshalas providing lodging facilities at very nominal charges. For the development of tourism as an industry

and to attract the foreigners Chitrakoot should be linked with air route.

INDUSTRIAL EMPLOYMENT

Agricultural sector alone has no capacity to absorb the rural unemployed population, therefore, rural industrialization is essential both for stimulation of additional employment and generation of income opportunities and to fulfil the basic requirements of the rural population. There is no large scale industrial unit in the study area, therefore, number of personsengaged in industrial activities is small.

Fig. 3.8C shows the pattern of industrial employment in different types of industries. In all, 508 persons are employed in different manufacturing activities. Mineral based industries with 20.00 percent of total industrial units secure highest percentage of industrial employment (149 persons). On an average 3 persons are employed in one industrial unit. Besides, a number of household and cottage industries also engage working force. The total working force engaged in household industrial activities, shares 2.07% to total workers. The distributional pattern of household workers has been discussed in chapter second 'Settlement and Population Pattern'.

The above analysis reveals that although agriculture is most important sector of regional economy yet the role of animal husbandry mining, forestry and industry can not be overlooked in present economic development. As the study area is enriched with variety of resources, these activities can be developed as potential measures to strengthen the economic base of the region and to achieve the real goal of integrated area development.

..

REFERENCES

1. Buck, J.L. (1937) : Land Utilization in China, University of Nonking p.162, Cited by Tripathi R.L. (1978), Natural Resources and Prospects of Industrial Development in Bundelkhand Region of U.P., Unpublished Ph.D. Thesis, Kanpur University, p. 174.

2. Singh, S. and Chauhan, V.S. (1984) : Regionalization for Rural Development and Planning, Meerut, p.33.

3. Hussain, M. (1979) : Agricultural Geography, New Delhi, pp. 115-116.

4. Singh, J. (1979) : Central Places and Spatial Organisation in a Backward Economy Gorakhpur Region - A study in Integrated Regional Development, Gorakhpur, P. 84.

5. Husain, M. (1979) : Op.cit, pp.120-121.

6. Weaver, J.C. (1954) : 'Crop Combination Regions in Middle West,' Geographical Review, Vol.44, pp.175-200.

7. Raffiullah, S.M. (1965) : 'A New Approach to Functional Classification of Towns', The Geographer, Vol.XII, p.40-53.

8. Husain, M. (1979) : Op.cit. p.135.

9. Kendall, M.G. (1939) : 'The Geographical Distribution of Crop Productivity in England', Journal of Royal Statistical Society, Series CII, pp.21-48.

10. Bhatia, S.S. (1965) : 'Pattern of Crop Concentration and Diversification in India'. Economic Geography, Vol.XL, p.38-56.

11. Cf. Mahmood, A. (1977) : Statistical Methods in Geographical Studies, New Delhi, p.96.

12. Per acre yield of different crops is based on data obtained from field survey. Average yield of different crops at village level has been considered the per acre yield for whole area.

13. Shinde, S.D.(1980) : 'Agriculture in an Under Developed Region : A Geographical Survey, Bombay, p.115.

14. Singh, J.(1974) : 'An Agricultural Atlas of India: A Geographical Analysis, Khrukshetra, p.264.

15. Project Report on Drought Prone Area Programme of Banda District, Vol. I, 1974-79, p.124.

16. The estimation is based on the following criteria. Per head cattle provides-

$$N = 25 \text{ Kg}, P_2O_5 = 12 \text{ Kg}., K_2O = 5 \text{ Kg}.$$

Per head sheep provides - $N = 25$ Kg., $P_2O_5 = 50$ Kg., $K_2O = 15$ Kg.

Per head bird provides $N = 43$ lbs, $P_2O_5 = 10$ lbs, $K_2O = 36$ lbs.

(vide, Arora, R.C.(1979):Integrated Rural Development, New Delhi, p.181.

17. Project Report on Drought Area Programme op.cit., p.123.

18. Based on the data received from Senior Inspector (Fisheries) Kaloopur Fish Farm, Kaloopur (Karwi), Banda.

19. Swarup, P. and Shrivastava,S.C. (1968) : Progress Reports on the Bauxite Deposits, Discovered in the Rajauhan Forest Block, Banda District (Unpublished Report), Directorate of Geology and Mining, U.P. Lucknow, p. 2.

20. Tripathi,R.L. (1978) : Op.cit.,p. 232.

21. Mehdirtha,R.C. (1967) : Geology of India, Pakistan and Burma, Delhi, p.188.

22. Tripathi,R.L. (1978) : Op.cit., p. 229.

23. Ibid. p.233

24. Sagreiya, K.P. (1967) : Forests and Forestry, New Delhi, p.1.

25. Action Plan Banda Forest Division (1974-75) to (1983-84) First Circle, U.P. Nainital, (1978).

26. Rao, R.V. (1978) : Rural Industrialization in India, New Delhi, p.1.

...

CHAPTER - IV

SPATIAL ANALYSIS OF CENTRAL PLACES

In developing countries like India, with their multi-faceted problems, it is necessary to create conditions to induce growth and development in their countrysides through spatio-functional integration and co-ordination of settlement systems[1]. Spatial imbalance in development is one of the challenging problems in the field of regional development and planning. The factors contributing to such type of areal differentiation may be expressed as (i) limitation of resources in particular area and (ii) variations in occurrences of social and economic activities among the settlement but the latter is more responsible than the former. For the elimination of these regional imbalances, the identification of appropriate locations (central places) within spatial frame, in order to decentralise the social and economic activities, is one of the basic strategies for balanced regional development.

Central place system may provide the basic frame work for rational distribution of clusters of services and functions accessible to the maximum profit areas in command at different hierarchical levels of settlements and location of growth centres. Thus, the utility of central place system increases in a developing country like India, because a reorganisation of space conductive to economic development is possible only on this basis.

Central Place conceptual Frame

Central place is considered as such a focal point of

distinguished status which extends functions and services to its own population as well as to its hinterland. A centrally located place can not be designated as central place unless it has some central functions and service jurisdiction. Thus, central places provide central goods and services to areally or point bound dispersed settlements located within their respective complementary regions of various orders in accordance with their importance and centrality governed by the economic distance and range of services and goods[2].

The theoretical concept of central place (Christaller's Zentralort) was propounded by Mark Jefferson[3] in 1931 for a settlement which is necessarily the focus of various activities, mostly socio-economic in nature, for its surrounding hinterland. It is the most important aspect of theories laid by two German scholars Walter Christaller[4] and August Losch[5]. Christaller's work was mainly based on wholesale distribution of Commodities and services while Losch concentrated on theories of regional analysis and economics of location. Various foreign and Indian scholars have studied the different aspects of central places in the view of Christaller's ideas of regional frame work. The next important aspect of central place theory is central functions which by their nature tend to concentrate around certain points.

Central Functions

The central function by its nature is available in few

settlements and is being availedby a number of settlements[6]. Central functions are defined as the functions of non-ubiquitous nature because of technological, economic and institutional considerations. The existence of central functions in certain locality creates a hinterland. Rao[7] viewed that central functions should not be defined only as the rarity or ubiquity of functions but also on the preference of the people both for producers as well as of consumers. Thus, any function, involving movement of population can be considered as central function. The degree of importance of a function is supposed to vary inversely with the frequency of its occurrence[8].

In the present study, 60 functions, including both policy and non-policy functions, have been considered. The selected functions have not equal opportunity of location. The settlements along road side and/or with local administrative set up, have comparatively much wider range of functions. Chitrakoot Dham (Karwi), the largest urban and administrative centre, enjoys almost all the functions followed by Manikpur and Pahari (both block headquarters) having 44 and 39 functions respectively.

CLUSTERING OF FUNCTIONS

The distribution of central functions usually depends upon the population size of the settlements. Besides, the

physical and other cultural factors particularly socio-political also produce variations in number and status of different functions. The distribution of functions exhibits the trend of uneven clustering (Fig. 4.1A & Table 4.1). As clustering of central functions at a place reinforces the centrality and induces the complementary services and facilities to get located at that place, this may be regarded as the dynamic aspect of the attributes.

Table 4.1 : Clustering of Functions

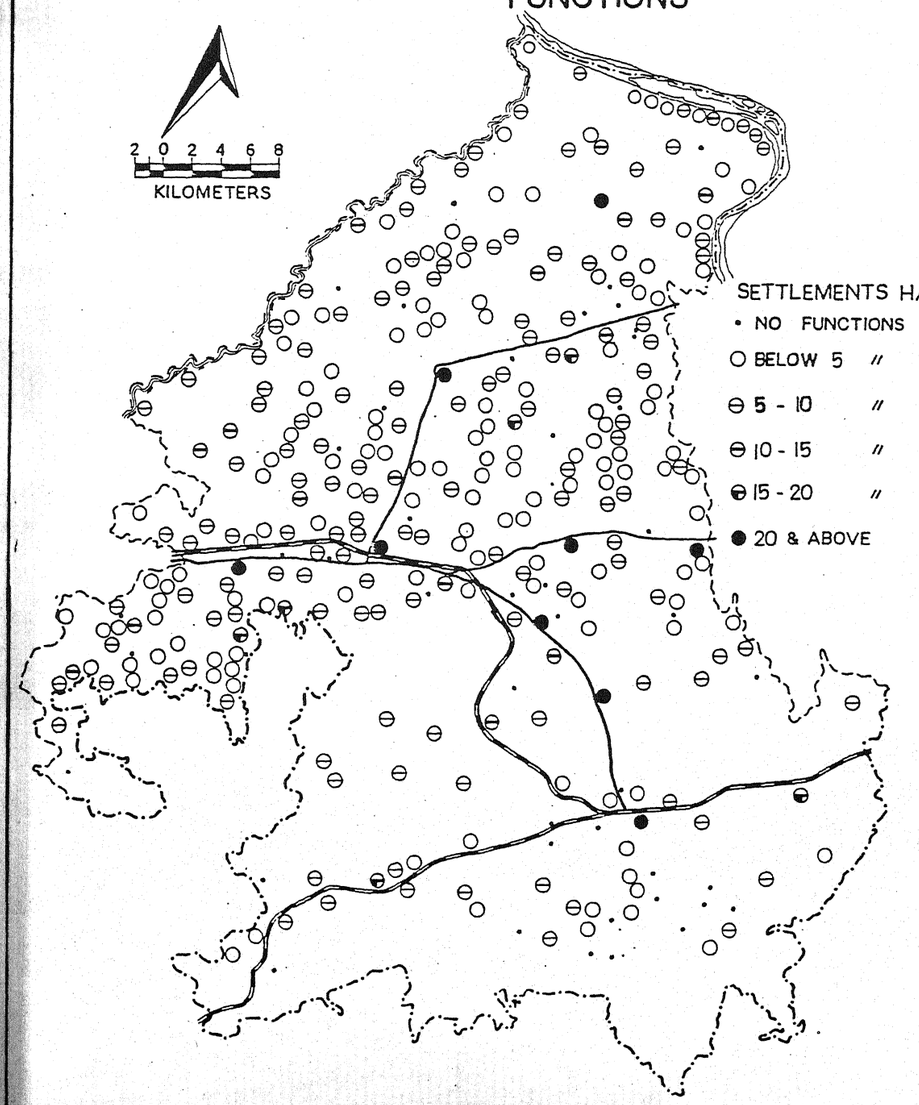
Size of settlements	No.of settle-ments	No. of Settlements with functions					
		Nil	<5	5-10	10-15	15-20	20 & Above
Below 200 persons	57	49	7	-	1	-	-
200-499	86	12	69	5	-	-	-
500-999	116	2	51	60	2	1	-
1000-1999	70	-	1	57	8	3	1
2000-4999	31	-	-	17	5	4	5
5000 & above	1	-	-	-	-	-	1
Urban	2	-	-	-	-	-	2
	363	63	128	139	16	8	9

The pattern of clustering of functions as revealed by tabular and map analysis, bring out the following characteristics -

TAHSIL KARWI

Ⓐ

SETTLEMENTS WITH CLUSTERS OF FUNCTIONS



Ⓑ

SIZE DISTRIBUTION OF SETTLEMENTS

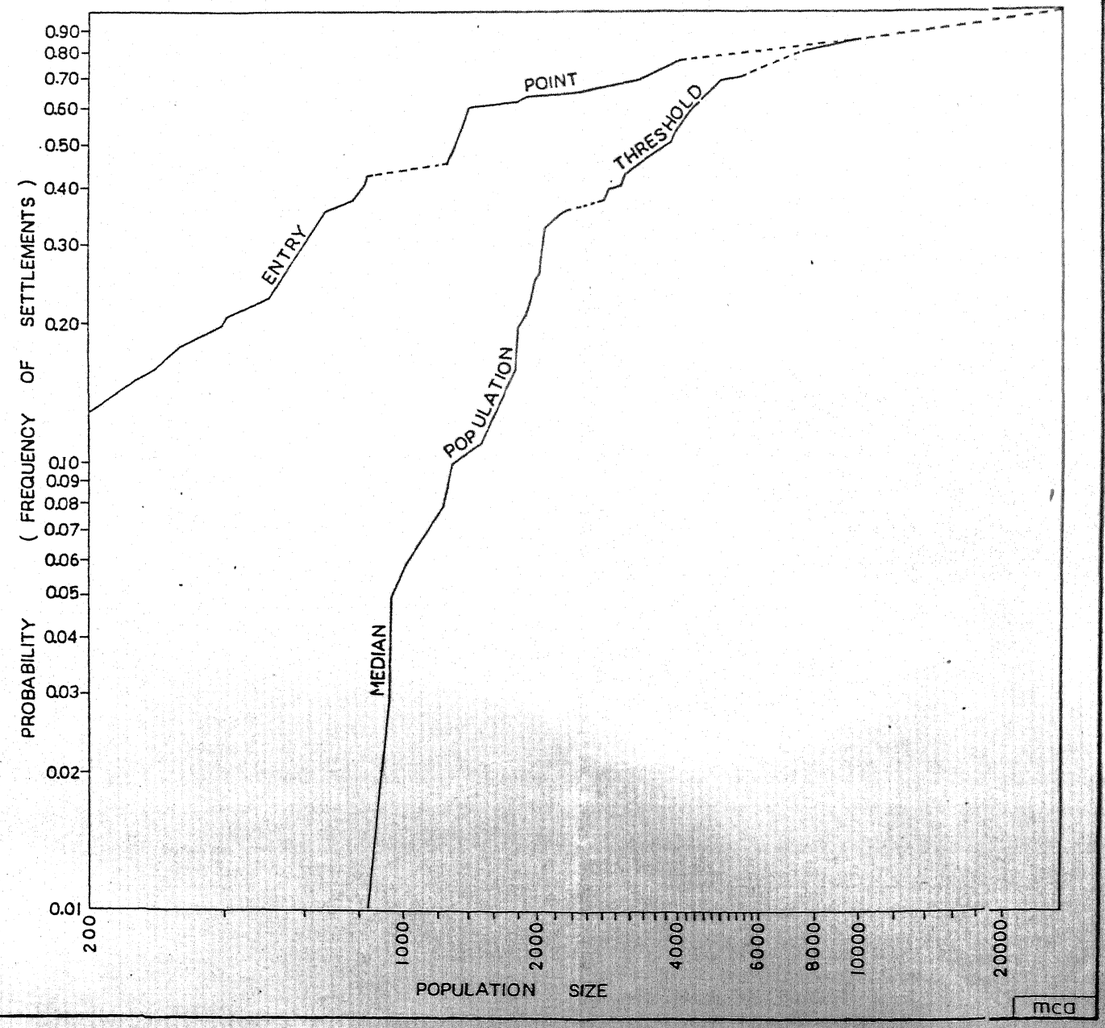


FIG.NO. 4.1

(i) Settlements of population less than 200 persons have hardly any function except primary school, small Kirana shop and village artisans etc.

(ii) The percentage of settlements having functions 20 and more is 2.48. The main rural settlements of this group are Pahari (39 functions), Bhaunri (36), Sardhua (26), Sheorampur (30), Raipura (27), Ainchwara (27) and Saraiyan (20).

(iii) The services and facilities of higher level such as education of high school and above standard, health facilities, credit institutions, veterinary hospital etc. are generally available in large size settlements falling in the population group of 2000-4999 persons.

(iv) Only two urban settlements i.e. Chitrakoot Dham (Karwi) and Manikpur Sarhat possess all the important functions and some functions of ubiquitous nature.

(v) The study divulges that larger the size of settlements wider the range of functions.

(vi) The pattern of spatial distribution of settlements having less than 10 functions reveals the fact that the large number of settlements of this group are located away from transport arteries.

(vii) The analysis proves that population size and accessibility seem to have influenced the process of clustering of functions.

FUNCTIONAL HIERARCHY

A central function is composed of many sub-functions and thus within a particular central function it is possible to identify different levels at which it is being performed[9]. The concept of functional hierarchy has its validity in the functional complexity of the settlements. Larger centres with variety of functions are more complex than the smaller one. It is evident that the study region neither exhibits a uniform distribution of functions nor the similar number of functions everywhere. This difference in the space and number, forms a base to find the scale of functional hierarchy.

The central functions are not very homogeneous in nature and hence any study of these functions should be taken into an account of their difference in levels in different settlements. The relative importance among the functions of same group can be adjusted by their levels e.g. private medical practitioners, health assistants, dispensaries and hospitals, belonging to similar functional group. Hence, they may be arranged into a group according to their relative importance.

In purview of the aforesaid facts, all the policy functions have been classified such as (a) Education, (b) Health, (c) Communication, (d) markets, (e) Extension services, (f) Credit and (g) Administrative and Security Services. Non policy functions being quite different in nature to each other have been considered as miscellaneous. Levels of sub-functions within each functional class of policy

functions form a hierarchic order of settlements while non policy functions impose their individual impact.

Determination of Function Hierarchy

Functions usually correspond with the size of settlement. In other words, it may be said that each function requires minimum population to sustain itself. The higher order centres possess all the functions of lower order centres and also perform some specialized functions, which require greater threshold or minimum consumption level for their viability than the lower order function requires. The population threshold is, therefore, considered to determine the functional hierarchy.

Population Threshold - Population threshold is defined as the minimum number of consumers required to support a given service[10] and is identical with the classical concept of the lower limit of goods[11]. In other words, population threshold or entry point has been referred to as a minimum population below which no settlement has a particular function. Table 4.2 shows entry points of different functions in the study area.

On the basis of entry points multi-level hierarchy of different functions has been visualized through plotting the minimum population size (threshold) of each function against

Table 4.2 : Functions with Entry Point (Threshold)

Sl. No.	Functions	Entry point	No.of Settlements above entry point	No.of Settlements having functions
1	2	3	4	5
(a)	Education			
1.	Primary School	133	325	227
2.	Junior High School	649	183	52
3.	High School	1200	75	5
4.	Inter College	1794	43	4
5.	Training Centre	27454	-	1
(b)	Health			
6.	Private Medical Practitioner	807	144	46
7.	Health Assistant	191	313	19
8.	Health Sub-Centre	191	313	28
9.	Dispensary	649	183	9
10.	Primary Health Centre	1353	56	3
11.	Hospital	27454	-	1
(c)	Communication			
12.	Request Bus Stop	750	151	12
13.	Regular Bus Stop	782	150	10
14.	Bus Station	9882	1	2

Table 4.2 (contd)

1	2	3	4	5
	15. Railway Station	191	313	9
	16. Branch Post Office	310	276	44
	17. Sub-Post Office	1353	56	5
	18. Telephone Exchange	27454	-	1
(d)	Markets			
	19. Daily Market	1269	69	7
	20. Cattle Market	4043	4	2
	21. Fair Market	474	225	6
(e)	Extension Services			
	22. Stockman Centre/ 'D' Class Dispensary	191	313	6
	23. Artificial Insemination Centre	1269	69	6
	24. Coat & Sheep Breeding and Wool Extension Centre	771	166	7
	25. Veterinary Hospital	649	183	7
	26. Agricultural Implements, Pesticides, Insecti-des Distribution Centre	4043	4	3
	27. Fertilizer Distri-bution Centre	170	314	30
	28. Seed Distributiom Centre	649	183	6

Table 4.2 (contd)

1	2	3	4	5
(f)	Credit			
	29. Co-operative Societies	191	313	35
	30. Co-operative/ Scheduled Banks	649	183	8
	31. S.B.I./Nationalized Banks	4043	4	4
(g)	Administrative & Security Services			
	32. Nyay Panchayat Headquarter	273	287	34
	33. Kanoongo Headquarter	1698	46	7
	34. Block Headquarter	4043	4	3
	35. Tahsil Headquarter	27454	-	1
	36. Police Chauki	1269	69	3
	37. Police Station	3242	8	4
(h)	Miscellaneous			
	38. Ata Chakki	387	251	124
	39. Kirana Shop	249	292	282
	40. Retail Cloth Shop	1353	56	5
	41. Ration Shop	649	183	131
	42. Village Artisan	394	249	242
	43. Books/Stationery	2356	22	6
	44. Cycle Repair	649	183	23
	45. Shoe Repair	1353	56	14

Table 4.2 (contd)

1	2	3	4	5
46.	Watch Repair	9882	1	2
47.	Radio Repair	9882	1	2
48.	Tea Stall	191	313	28
49.	Sweet Stall	649	183	15
50.	Electric Goods	4043	5	3
51.	Footwear	1353	56	11
52.	Studio	9882	1	2
53.	Diesel/Petrol	9882	1	2
54.	Hotel/Dharmshala	2012	32	3
55.	Wood Sawing	3242	8	6
56.	Medicine Shop	1353	56	5
57.	Auto Repair	27454	-	1
58.	Cinema	27454	-	1
59.	Optical Shop	27454	-	1
60.	Jewellery	27454	-	1

its frequency on a double logarithmic graph[12]. The resultant curve and breaks in the distribution of population at different levels form three tier hierarchy (Fig. 4.1B and Table 4.3).

Table 4.3 : Hierarchic Groups of Functions

Functional Levels	Relative Position in Hierarchy	Threshold Population Levels	No. of Functions
I	Low	Upto 807	26
II	Medium	1200-4043	20
III	High	9882 & above	14

(Each higher group also includes functions of its lower order groups)

Applying the entry point as population thresheld for the selected functions, it is observed that some functions exhibit themselves at quite low level of population whereas some at very high level. Besides, a settlement of very low population size has a particular function which is absent in so many settlements of higher populationsize. Thus, it is concluded that entry point method does not yield desired results.

Median Population Threshold - As the size of settlement may not be an important factor for holding any function, the population threshold or entry point may be replaced as entry zone. The lower limit of entry zone (entry point) is a point below which no settlement has particular function while at upper limit (saturation point) all the settlement possess it.

Considering the fact, Haggett and Gunawardena have tried to measure the median population threshold of a function as a middle point of entry zone. The 'Reed Muench Method' is a modest graphic/algebric representation of the median population threshold.

Using Reed Muench method for median population threshold, it is observed that due to very small range of functional presence, both curves do not intersect. Hence median value of each function, out of different population size groups has been calculated (Table 4.4). This median value can be expressed as cutting point of population above which presence of a function increases in such a way that 50% or more settlements will have the said function.

The population threshold of each function, thus obtained, exhibits entirely different picture. Fig. 4.1B shows the resultant curve and the breaks in the distribution of functions at various population levels. It is also observed that there are three distinctive breaks in the curve at population levels 2250-2750, 5500-7500 and 1000-27454. Thus, four levels have been identified in a hierarchy of functions as shown in Table 4.5.

The study results that median population threshold method is more realistic in the maintenance of the relative threshold value among the functions of similar nature and

Table 4.4 : Median Population Threshold (MPT) and MPT Indices of Functions

Sl.No.	Functions	MPT	MPTI
1.	Primary School	830	100
2.	Kirana Shop	832	100
3.	Village Artisan	850	102
4.	Request Bus Stop	1200	144
5.	Fair Market	1250	150
6.	Ata Chakki	1267	152
7.	Ration Shop	1449	174
8.	Stockman Centre	1667	200
9.	Railway Station	1667	200
10.	Fertilizer Distribution Centre	1722	207
11.	Branch Post Office	1750	210
12.	Police Chauki	1750	210
13.	Health Sub Centre	1800	216
14.	Junior High School	1857	223
15.	Cooperative Society	1883	226
16.	Nyaya Panchayat Headquarter	1923	231
17.	Private Medical Practitioner	1944	234
18.	Regular Bus Stop	2000	241
19.	Dispensary	2000	241
20.	Seed Distribution Centre	2000	241
21.	Cycle Repair	2160	260
22.	Tea Stall	2250	271

Table 4.4 (contd)

Sl.No.	Functions	MPT	MPTI
23.	High School	2750	331
24.	Health Assistant	2833	341
25.	Shoe Repair	3000	361
26.	Sweet Stall	3050	367
27.	Books/Stationery	3500	421
28.	Footwear	3500	421
29.	Primary Health Centre	3500	421
30.	Daily Market	3875	466
31.	Electric Goods	3875	466
32.	Medical Store	3928	473
33.	Cooperative/Schedule Bank	4000	481
34.	Sheep & Goat Breeding Centre	4250	512
35.	Sub Post Office	4250	512
36.	Veterinary Hospital	4250	512
37.	Kanoongo Headquarter	4500	542
38.	Retail Cloth Shop	4500	542
39.	Artificial Insemination Centre	5000	602
40.	Police Station	5000	602
41.	Wood Sawing	5000	602
42.	Cattle Market	5000	602
43.	Intermediate College	5500	662

Table 4.4 (contd)

Sl.No.	Functions	MPT	MPTI
44.	Agricultural Implements, Pesticides, Insecticides Distribution Centre	7500	903
45.	Block Development Headquarters	7500	903
46.	SB.I./Nationalized Bank	7500	903
47.	Watch Repair	7500	903
48.	Radio Repair	7500	903
49.	Hotel/Dharmshala	7500	903
50.	Bus Station	10000	1204
51.	Diesel/Petrol Shop	10000	1204
52.	Studio	10000	1204
53.	Cinema	27454	3307
54.	Telephone Exchange	27454	3307
55.	Auto Repair	27454	3307
56.	Jewellery	27454	3307
57.	Optical Shop	27454	3307
58.	Hospital	27454	3307
59.	Training Centre	27454	3307
60.	Tahsil Headquarter	27454	3307

Table 4.5 : Hierarchic Groups of Functions

Functional levels	Population Levels	No.of Functions
I	830-2250	22
II	2750-5500	21
III	7500-10000	9
IV	Upto 27454	8
		60

(Each higher level group also includes the functions of its lower

group than entry point technique, as entry point technique shows an abrupt trend as well as many folded gaps in values.

Identification and Hierarchy of Central Places

All the central places are not equally important. The higher order centres provide a wide range of goods and services to the population of larger area in which the central functions of lesser importance exist. The lower order centres on the other hand, hold a small range of services and functions to its surrounding areas. The higher order places also possess the lower order ubiquitous functions. These are fewer in number and more widely spaced than the lower order places and thus command a larger hinterland. The fundamental difference in the status of the central places has given birth ultimately to a concept of hierarchy and thus a chain of inter linkage centres comes into existence in the space. The study of hierarchic ordering of the central places has attained added significance as it provides a structural base for enhancing the pace of development in an area.

Identification of central places and their hierarchy have been undertaken by various scholars adopting different methodological approaches. For the identification of central places, different indicators have been taken into consideration such as consumer's shopping behaviour (preference) by Berry[13], persons employed in retail trade by Godlund[14], commercial population by Singh[15] and composite ranking by Bhat[16]. Sen[17] has developed various devices for the purpose. For the

measurement of centrality, the basic factor for identification of central place, the central functions or services have been taken as indicator by Smails, Brush, Carter, Carel and Dickinson[18].

Methods based on aforesaid indicators such as distance, population, existing infrastructural facilities and movement of people to avail these facilities, suffer one or another weaknesses. Use of the more than one method based on multiple criteria is, therefore, considered more reliable than the use of any single method based on single criterion[19]. For the study purpose, following methods have been tested -

(i) Space Preference Method

(ii) Relative Centrality Method

(iii) Scalogram Method

SPACE PREFERENCE METHOD

The space preference means the preference or choice of people for centres for the specific functions and thus implies the socio-economic interactions between the centres and their dependent villages. To identify the central places of the study area, the socio-economic interactions between dependent settlements and central settlements for the fulfilment of social requirement is observed. Taking into consideration of functional groups of all four levels (Table 4.5), effort has been made to identify the hierarchy of settlements on

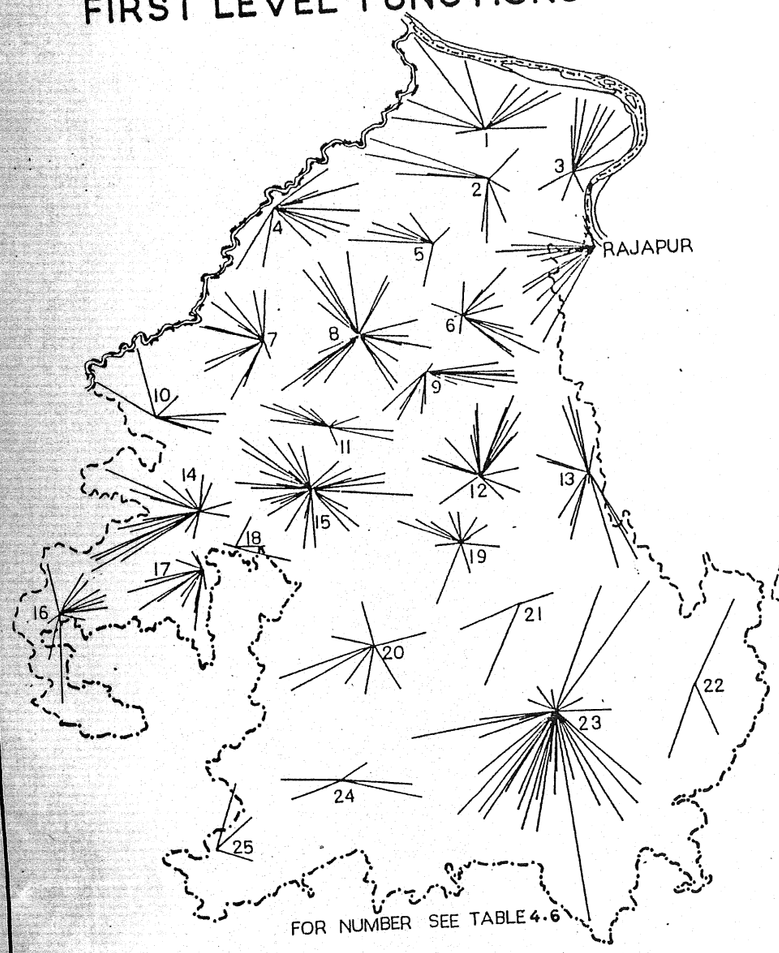
the basis of space preference.

The data, based on both primary and secondary sources have been used in the study. The secondary data, regarding the population size of settlements and presence of services and functions, have been collected from their respective departments. The data, regarding non-policy functions, are based on primary survey. The field questionnaire (Appendix 'A') used in the survey contains a query where do most of the people (more than 60%) of the settlement normally go to satisfy their socio-economic demands in respect of particular facility. Such type of choice of people is termed as space preference. The question was asked to the 10% of the households of all settlements of the area to obtain the data for each settlement and for every function of four levels of functional hierarchy. Thus, the combined preference for all the functions belonging to a particular functional level was collected. If one village prefers another village for more than 50% functions of a level, then the preferred village, is considered as a central place for the other village. For showing the interlinkages between dependent villages and central place, a line has drawn between the centres. In this way, space preference data have been plotted for all the settlements on the maps separately for each level of functional hierarchy (Fig. 4.2). Thus, the centres at each of four levels of functional hierarchy have been identified with details as under -

TAHSIL KARWI

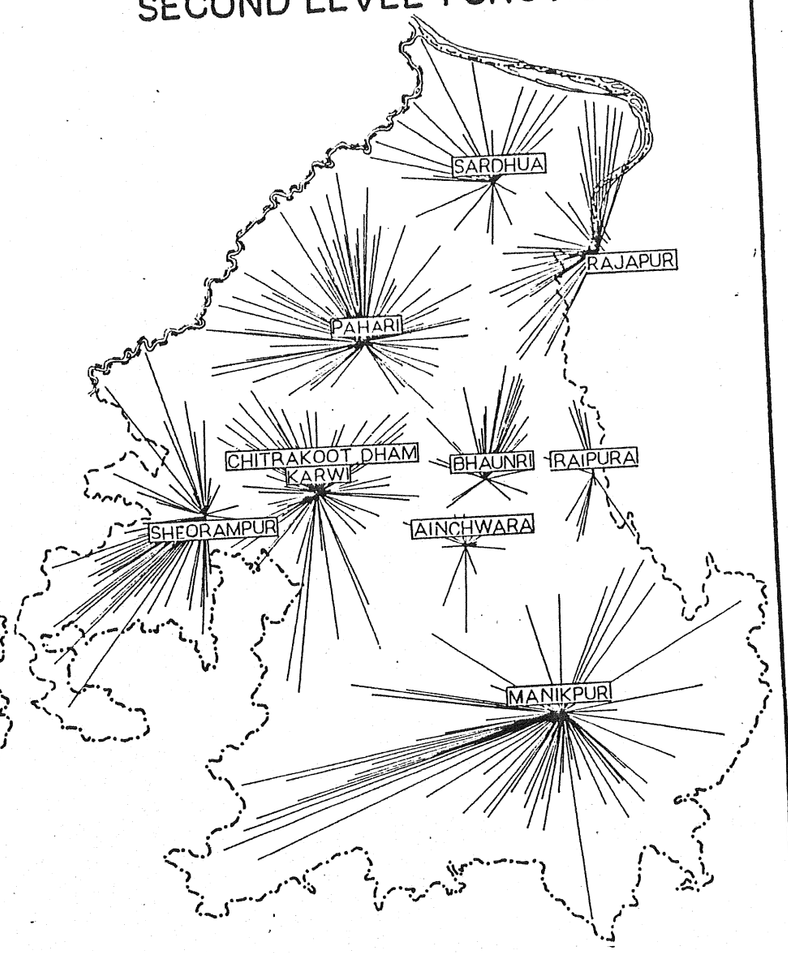
PEOPLE'S CHOICE OF CENTRES FOR

FIRST LEVEL FUNCTIONS

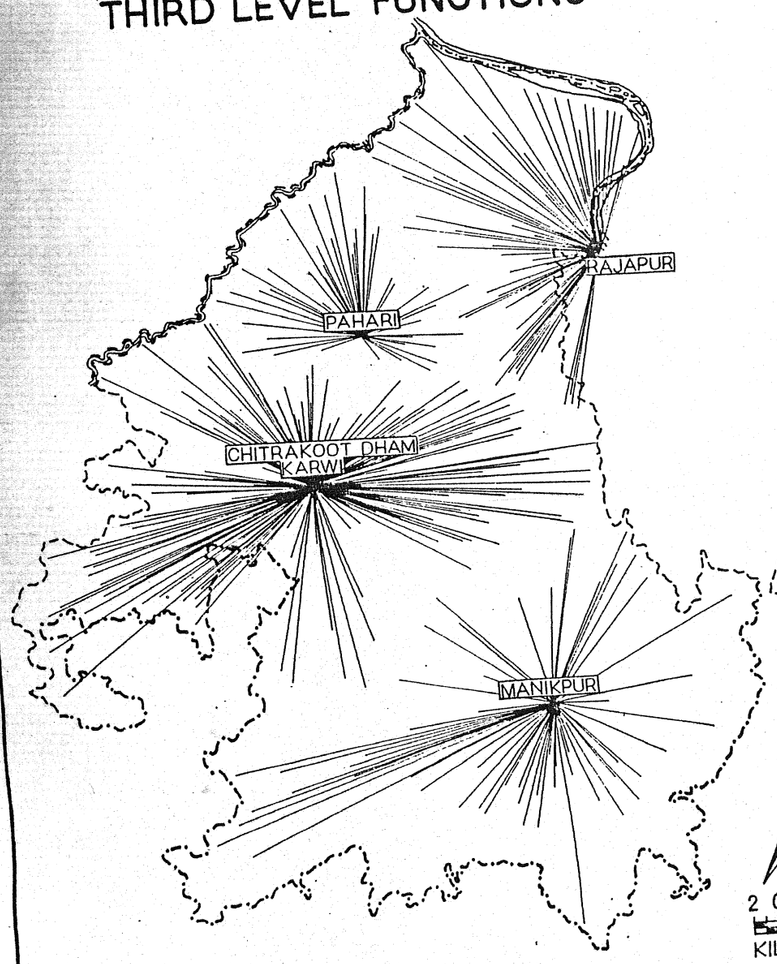


FOR NUMBER SEE TABLE 4.6

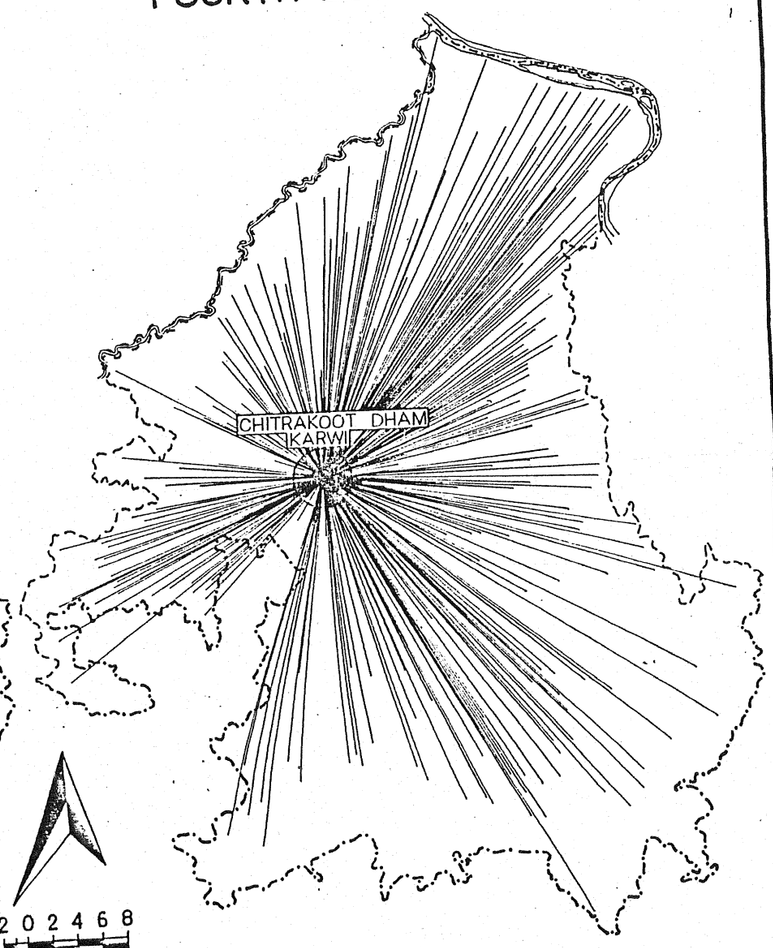
SECOND LEVEL FUNCTIONS



THIRD LEVEL FUNCTIONS



FOURTH LEVEL FUNCTIONS



2 0 2 4 6 8
KILOMETERS

mca

FIG.NO. 4.2

First Order Centre (IV level of functional hierarchy).

1. Chitrakoot Dham (Karwi).

Second Order Centres (III level of functional hierarchy).

1. Pahari,
2. Manikpur
3. Rajapur (outside of the region).

Third Order Centres (III level of functional hierarchy).

1. Sardhua,
2. Sheorampur
3. Raipura
4. Ainchwara
5. Bhaunri

Fourth Order Centres (I level of functional hierarchy).

1. Bardwara
2. Bhadedu
2. Ora
4. Lohda
5. Bachharan
6. Parsaunja
7. Nandi
8. Chakaundha
9. Bhaisaundha
10. Ghuretanpur
11. Khohi
12. Sitapur
13. Saraiyan
14. Rukma Khurd
15. Itwa Dudaila
16. Markundi
17. Unchadeeh

(Each higher order centre also serves as its lower order centres).

Observations

Although space preference method is the best suitable

method for assessing the trend of people mobility through the selection of centres for their functional need, it shows the following demerits with reference to the study area.

(i) The method is based on approximation of functions and choice of place. As 22 functions considered at first level, the centres having 11 functions or less have been ignored. In few cases these 11 functions may be more important than the 12 or more functions having which, a centre has been assigned as central place. Similarly, there is no importance of the choice of 40% population.

(ii) Due to approximation of functions and choice, some centres are ignored, although they provide services to the local areas.

To avoid the impact of aforesaid shortcomings, other methods have also been tested.

RELATIVE CENTRALITY METHOD

Centrality, the principal base in the determination of settlements hierarchy, is the outcome of quantity and quality of central functions performed by settlements. The centrality is positively affected by the level of functions performed rather than the variety of functions available. Thus, it may be concluded that higher centrality is the result of higher level of functional hierarchy.

Christaller's[20] hypothesis on the degree of centrality of places was based on the telephone connections at place. Green[21] decided the centrality of central places of West England on the basis of bus services. Brush and Bracey[22] assessed the importance of centres by (i) measurement of the business activities and other services, existing in the centre and (ii) determination of the area dependent upon the centre for goods and services. For the measurement of centrality, Godlund[23] used the population engaged in retail trade. Tewari[24] calculated the centrality of service centres by using the following formula of Godlund with slight modification :-

$$C = \frac{P\ 100}{T}$$

Where C = Centrality

P = Number of persons engaged in tertiary services in a settlement.

T = Total tertiary population of a region.

K.N. Singh has also adopted this formula considering the commercial population instead of population engaged in tertiary activities. The criteria like commercial population is not suitable in the study area due to its rural nature. In all, emphasis has been laid upon two major properties in whole central place system i.e. (i) the type and volume of the functions offered by a place and (ii) the degree of dependency of other settlements on the central place for

these functions. In the present study, both factors have been included in the measurement of centrality in addition to their population.

The volume and type of functions have been measured by composite score of Median Population Threshold Indices (CSMPTI). To get the composite score of MPTI the values of MPTI of all the functions (Table 4.4) available at a place are added together. Population served by a centre or degree of dependency has been calculated on the basis of space preference as described earlier. The scores, thus obtained are added together to get the total score for each centre. The following formula, derived by Sen[25], has been used to obtain the 'Centrality Index' on the basis of total score.

$$CI = \frac{AS \times 100}{MS}$$

Where CI = Centrality Index

AS = Actual Score of the Centre

MS = Maximum total Score

Centrality index and centrality rank of different centres are shown in table 4.6. It is evident that hierarchic levels of the centres are the same as obtained by space preference method.

Population - Size VS Centrality

Centrality of a central place is closely related with

Table 4.6 - Centrality Index and Centrality Rank of Centres

Sl. No.	Name of Central Place	Population	CSMPTI	Total Score	Centrality Index	Centrality Rank
1.	Bardwara	13851	2474	16325	16.76	10
2.	Sardhua	15786	7145	22931	23.56	6
3.	Bhadedu	11783	2737	14520	14.90	13
4.	Ora	11405	3403	14121	14.49	15
5.	Lohda	9014	2496	11510	11.80	20
6.	Bachharan	6956	4916	11872	12.17	18
7.	Parsaunja	12581	2965	15546	15.96	11
8.	Pahari	22101	1594	38050	39.12	3
9.	Nandi	7919	4126	12045	12.35	17
10.	Bhaisaundha	11177	2994	14171	14.54	14
11.	Chakaundha	8033	2302	10335	10.59	21
12.	Bhaunri	17525	12414	29939	30.77	4
13.	Raipura	13700	7674	21374	21.96	7
14.	Sheorampur	18934	9931	28865	29.67	5
15.	Karwi	51330	45849	97179	100.00	1
16.	Ghuretanpur	6261	2311	8572	8.78	24
17.	Khohi	12105	4686	16791	17.24	9
18.	Sitapur	4641	4724	9365	9.59	23
19.	Ainchwara	11769	8489	20258	20.81	8
20.	Rukma Khurd	12126	2695	14821	15.21	12
21.	Saraiyan	7513	4845	12358	12.67	16
22.	Unchadih	6059	4121	10180	10.43	22
23.	Manikpur	29723	23098	52821	54.33	2
24.	Markundi	7307	4280	11587	11.88	19
25.	Itwa Dudaila	4942	3120	8062	8.25	25

the population size and complexity of functions performed by it. The population size of the centre may be considered as more important variable for any existing and potential functions. The larger size of population creates the greater demand for services and produces stronger pull of place to attract them.

The centrality indices of the central places range from 8.25 (Itwa Dudaila) to 100 (Chitrakoot Dham) and population of the centres from 1117 (Chakaundha) to 27454 (Chitrakoot Dham). The regression analysis of these two variables shows a high positive co-relation (r = + 0.917) at 1% level of significance. But the examples are not lacking where small size settlements secure higher centrality score due to their more favourable location with respect of transport and trade routes. The examples of Sheorampur (1353) and Markundi (649) may be cited in this regard which being located along transport artery attain high centrality.

SCALOGRAM METHOD

The scalogram method, at once, ranks in terms of importance of the settlements or places on one hand and institutions and infrastructural facilities on the other[26]. On the basis of data available, the scalogram has been prepared for the establishment of the functional hierarchy of settlements (Fig. 4.3).

FUNCTIONAL SCALOGRAM

TAHSIL KARWI

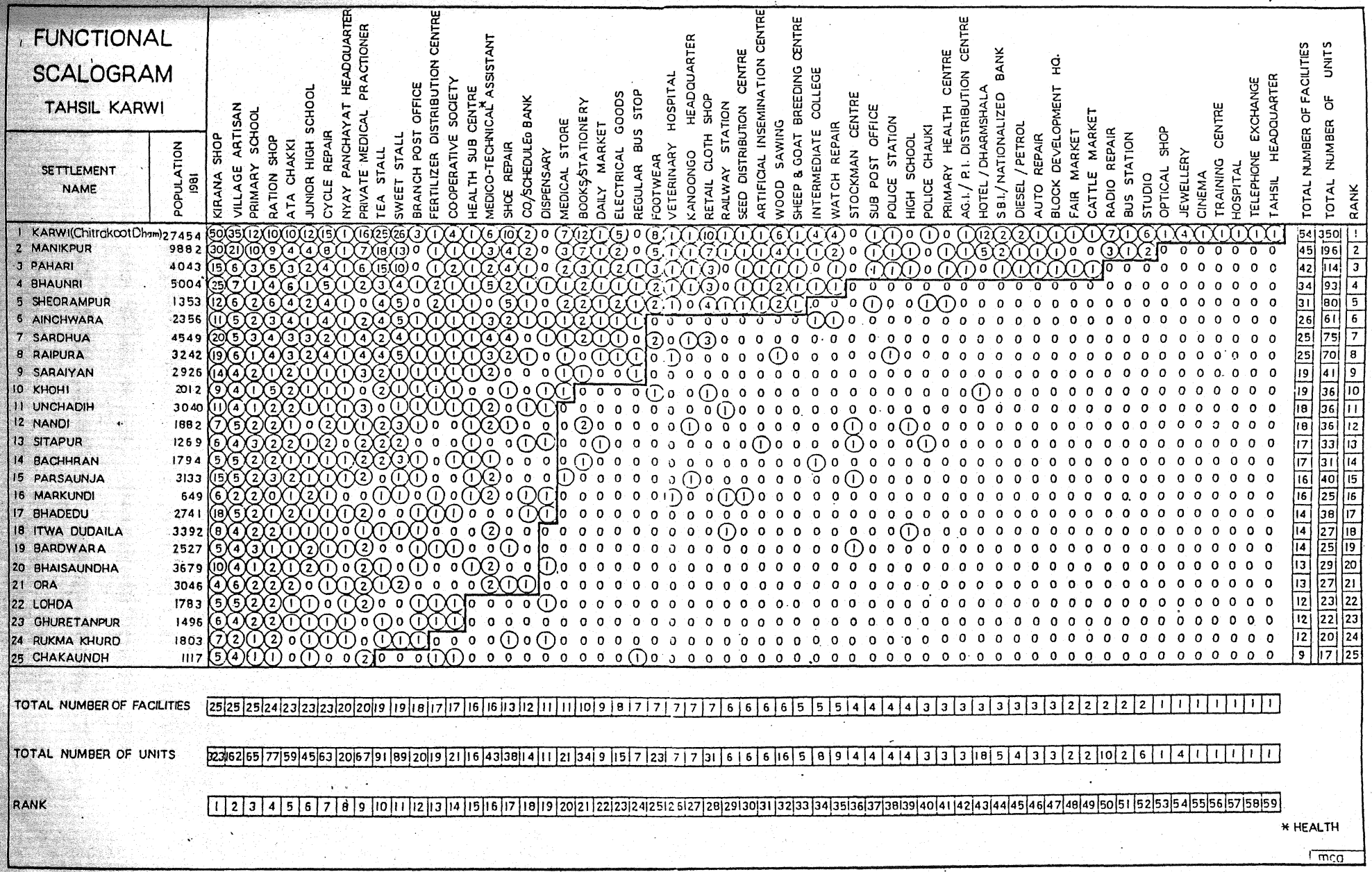


FIG. NO. 4.3

The comparative appraisal of above three methods, used for identification of central places and determination of hierarchy their of, reveals that in all three methods, hierarchic level of the centres remains same although slight variation in the hierarchic order of centres, within each hierarchic level is observed. Finally, the four orders of central places i.e. first order, second order, third order and fourth order have been identified and designated as (i) Regional Town, (ii) Locality Node, (iii) Market centre and (iv) Central village. The villages which are dependent on another centres for their social and economic needs have been termed as dependent villages, having no function and semi dependent villages, having some small range of functions.

Chitrakoot Dham (Karwi), being the Sub-division seat of administration, holds a prime status in the region with highest centrality index (100). Manikpur and Pahari, treated as locality nodes, are block headquarters. These centres extend facilities like primary health centre, post and telegraph, inter college/high school, daily market, banks and all other facilities available at block-headquarters. The regional market centres of third order are Sardhua, Sheorampur, Bhaunri, Raipura and Ainchwara. These are the centres providing services like dispensary, health sub-centre, sub-post office etc. They act as bridging links between rural and urban areas. Seventeen fourth order centres, are mostly nyay panchayat headquarters. These

centres provide junior high school, private medical practitioner, branch post office, co-operative society and cluster of shops.

Spatial Pattern of Central Places

The spatial pattern of central places demonstrate that transport arteries, line of natural defence afford by river banks, seat of administration market etc. have favoured the localization of central places while ravine and dissected tract, ill-drainage, lack of transportation are negative factors for their development. The concentration of central places is observed along transport arteries. (Fig. 4.4A).

The distributional pattern of central places has been analysed through nearest neighbour method[27]. The analysis reveals that the distribution is approaching towards regularity (Rn = 1.42, Z = 4.10). This pattern of distribution can also be evidenced by intensity of random disturbance measured by Normalised Index[28] (Di) which ranges between 0.55 and 0.80. Table 4.7 presents the distribution pattern of central places of different orders.

Table 4.7 : Spatial Characteristics of Central Places

Orders	No.of central places	Spacing (Kms.) rO	rE	Hd	Disperson Rn	Di	rO as % of Hd
I	01	38.00	23.05	49.54	1.64	0.763	76.70
II	02	27.50	16.30	35.03	1.68	0.785	78.50
III	05	13.50	10.31	22.15	1.30	0.615	46.54
IV	17	6.69	5.59	12.02	1.19	0.556	55.64
Region	25	6.59	4.61	9.96	1.42	0.664	66.16

TAHSIL KARWI

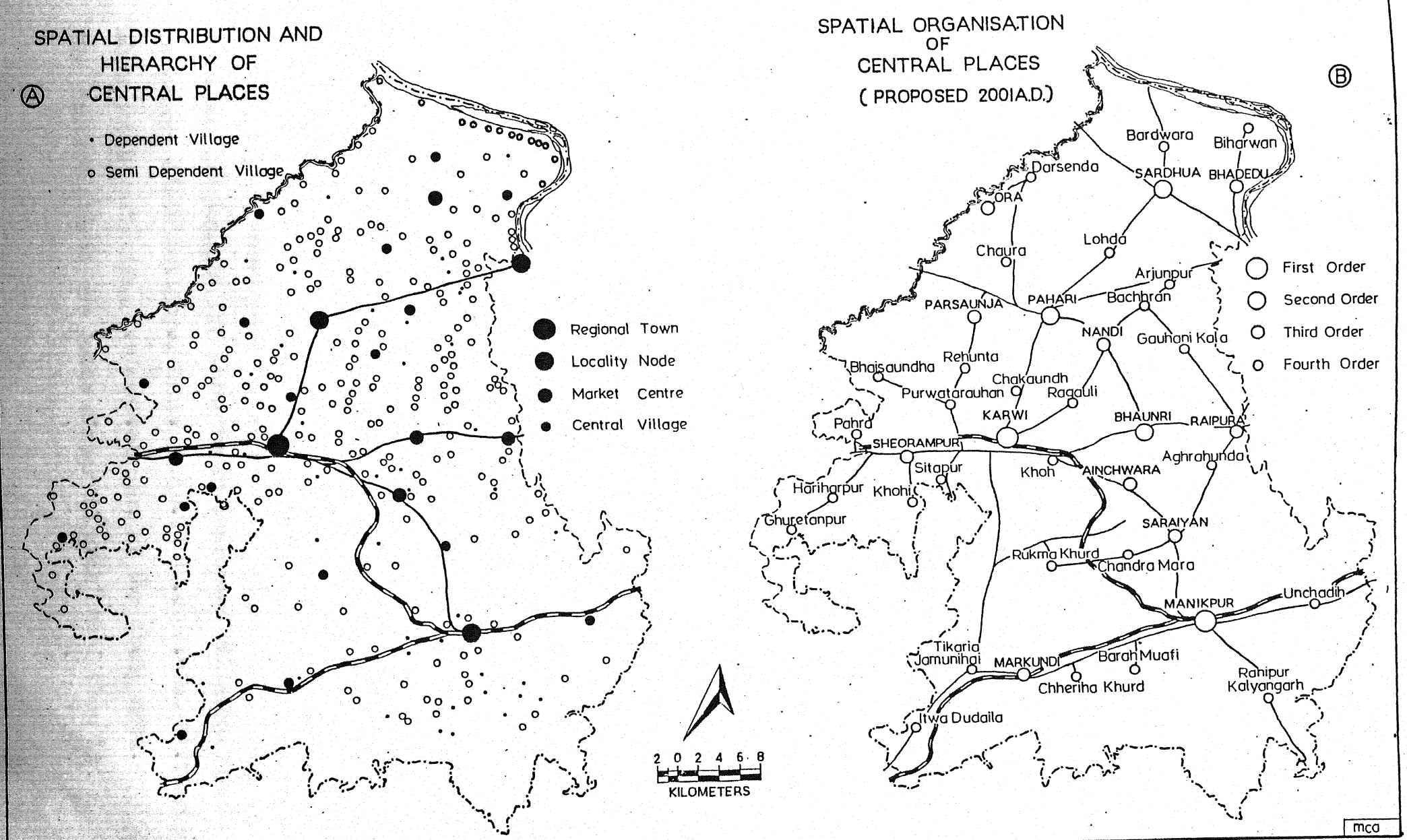


FIG.NO. 4.4

The existing spatial organisation of central places shows intra-regional imbalances. It, therefore, seems essential to compare the existing pattern with hypothetical and ideal situation. The observed mean distance (rO) is much less than corresponding hypothetical distance[29] (Hd) between the central places of all orders. The maximum uniformity is observed in the distribution of first and second order centres where percentages of mean distance to hypothetical distance are 76.70 and 78.50 respectively. It may be suggested that a K = 4 hierarchy (Christaller's transport principle) holds more relevance than K = 3 and K = 7 indicating the effect of transport on development of central places. According to transport principle the lower order centres are located at the mid points of the direct route connecting two higher order central places.

Spatio-functional Gaps

The existing distribution of central places does not possess required number of central places. On an average each central place in the region serves about 14 villages but the figure reaches upto 37 in case of fourth order centres. These centres play a major role in diffusion of attainment of economic development and planning to dependent villages. Due to uneven distribution of central places inter-centre distances show great variation. In central part of the study area, the central places are quite closer to each other than in

northern and southern parts. Even if, the existing centres are uniformily distributed, the inter-centre distances are not sufficiently enough to promote the developmental activities. Hence an average distance 5 Kms (population 7500 persons) for central villages, 10 Kms (population 15000 persons) for market centres, 20 Kms (population 7000 persons) for locality nodes and 40 Kms (population 200000 persons) for regional town would require 85 centres of fourth order, 21 centres of third order, 5 centres of second order and 2 centres of first order (Table 4.8). These figures when compared with existing number shall give actual number of central places to be developed in each category to achieve balanced regional growth.

Table 4.8 : Existing and Required Number of Central Places

Order	Central Places	Inter-centre distance (Kms)	Service area (Km^2)	Population served	Number of Central Places	
					Existing	Required
I.	Regional Town	40	1600	200000	1	2
II.	Locality Node	20	400	7000	2	5
III.	Market Centre	10	100	15000	5	21
IV.	Central village	5	25	7500	17	85

The population threshold and range of goods and services criteria help a planner in arriving at the best possible locations for the deployment of socio-economic facilities in a region[30]. The concept of population threshold has been used

to identify the functional gaps in regional system. The settlement, having desired threshold population for a particular function, if does not possess the same, there exists a functional gap. For identification of functional gaps all such settlements have been listed. The techmique has been applied in the planning of policy functions only because due to governmental assistance, the development of these functions would be more than non policy functions. It is to be pointed out that the concentration of policy functions attracts the non policy functions.

The second category of functional gaps have been marked on the basis of demand or distance of functions using above concept in modified form. In some cases, the different small size settlements located in an area, individually may not have the required threshold for a particular function, the group of settlements collectively satisfy to it. Hence, the function could be proposed only if, the demand for the same is in existence. In such cases the selection of appropriate settlement from the group of settlements has been made on the basis of aggregate travel distance.

Functional gaps between the orders of central places have been identified on the basis of composite score of MPTI for all the functions available at particular centre (Table 4.6). Chitrakoot Dham (Karwi) ranks first with composite score 45849. Second order centres i.e. Manikpur

and Pahari range between 25000-15000 while third order centres fall within 5000-10000. Fourth order centres possess the composite score below 5000. It is obvious that the difference between first and second order is much greater than between second and third and between third and fourth. This difference has occurred mainly due to variation in levels and number of units of the functions at different order centres. Spatial gaps have also emerged due to the same reasons but locational factors have been the root-cause. The marked functional gaps among the different order central places may be conceived as 'development dichotomy. This has prevailed due to the socio-economic gaps between central places and their surrounding areas. The uneven distribution of functions has divided the region into modern and traditional sectors. In order to reduce the spatio-functional gaps, new central places are to be located at suitable places.

...

REFERENCES

1. Singh, K.N. et al.(1985) : 'Service centres and Development Strategy in Vindhyachal-Baghelkhand Region: A Spatio-functional Approach'. The National Geographical Journal of India Vol.31,Pt. 2, p.73.

2. Singh,J.(1979) : Central Places and Spatial Organisation in a Backward Economy : Gorakhpur Region; A Study in Integrated Regional Development, Gorakhpur, p.5.

3. Mark, Jefferson (1931) : 'Distribution of Worlds City Folks' Geographical Review Vol.21, p.453.

4. Christaller,W. (1933) : 'Die Zentralen Orte in Suddeutschland' translated by Baskin, C.W.(1966) as The Central Place of Southern Germany, Englewood Cliffs.

5. Losch, A.(1941) : 'Die raumliche Ordnung der Wirtschaft' translated by Baskin, C.W.(1966) as The Central Place of Southern Germany, Englewood Cliffs.

6. Warmali, S.(1970) : Regional Planning for Social Facilities. A case Study of Eastern Maharastra, NICD,Hyderabad, p. 79.

7. Prakash Rao, V.L.S.(1972) : 'Problem of Micro-level Planning' Behavioral Sciences and Community Development,Vol.6, No.1, p. 151.

8. Warmali, S. & Khan, W.(1972) : 'Conceptual and Methodological Dimensions of Central Place Theory' in Readings in Microlevel Planning and Rural Growth Centres (Ed.) Sen, L.K., p.178.

9. Sen.L.K. et al. (1971) : Planning Rural growth Centre for Integrated Area Development : A Case study of Miryalguda Taluka, NICD,Hyderabad, p.81.

10. Bunge, W.(1962) : Theoretical Geography, Lund Studies in Geography, Series C, General and Mathematical Geography No.I,p.142.

11. Sen,L.K.et al. (1971) : Op. cit. p.148.

12. Sen,L.K. et al. (1975) : Growth Centres in Raichur : An Integrated Area Development Plan for a District in Karnataka, NICD Hyderabad, p.62.

13. Berry, B.J.L. (1967) : Geography of Market Centres and Retail Distribution, London, pp. 10-23.

14. Godlund, S.(1956): 'The Functions and Growth of Bus Traffic within the Sphere of Urban Influence. Lund Studied in Geography. Series B No.18,pp.13-20.

15. Singh,K.N.(1966) : 'Spatial Pattern of Central Places in Middle Ganga Valley, India,' N.G.J.I., Vol. XII, No.4,pp.220-21.

16. Bhat, L.S. et al. (1976) : Micro Level Planning - A case study of Karnal Area, Haryana, India, New Delhi, pp.67-105.

17. Sen, L.K. et al. (1971) : Op.cit. p. 80 ff.

18. Mishra, S.P. (1985) : Integrated Rural Area Development and Planning: A Geographical Study of Kerakat Tahsil,District Jaunpur (U.P.) Varanasi, p.74.

19. Roy, P. and Patil,B.R.(1977) : Manual for Block Level Planning, Delhi, p.26.

20. Christaller,W. (1933) : loc. cit.

21. Green, F.H.W. (1948) : 'Motor Bus Services in West England', Transactions Institute of British Geographers, 14, pp. 59-68.

22. Brush,J.E. and Bracey,H.E.(1967) : 'Rural Service Centres in South Western Wisconsin and Southern England' in Reading in Urban Geography Eds.Mayer,H.M. and Kohn, C.F. Allahabad, p. 213.

23. Godlund,S.(1956) : loc.cit.

24. Tewari, R.C. and Khan, N.U. (1984) : 'Spatial Organisation of Rural Service Centres in Pratapgarh District' National Geographer, Vol.XIX, No.2, p.89.

25. Sen.L.K. et al. (1975) : Op.cit., p.74.

26. Roy, P. and Patil, B.R. (1977) : Op.cit., p.27.

27. Clark, P.J. and Evans, F.C. (1954) : 'Distance to Nearest Neighbour as a Measure of Relationship in Population' Ecology, Vol.35, pp.445-453.

28. Normalised Index $Di = ro/1.0746\sqrt{a/n}$

Where ro= Observed mean distance

a = area of the unit

n = number of central places in the unit

29. Mather, E.C. (1944) : 'A Linear Distance of Farm Population in the United States', A.A.A.G., Vol. 34, pp. 173-183.

(Hypothetical Distance $Hd = 1.0746\sqrt{a/n}$

Where a = Area

n = Number of central places.

30. Sen, L.K. et al. (1971) : Op.cit, p. 148.

...

CHAPTER - V

SPATIAL ORGANISATION

OF

INFRA-STRUCTURAL PURSUITS

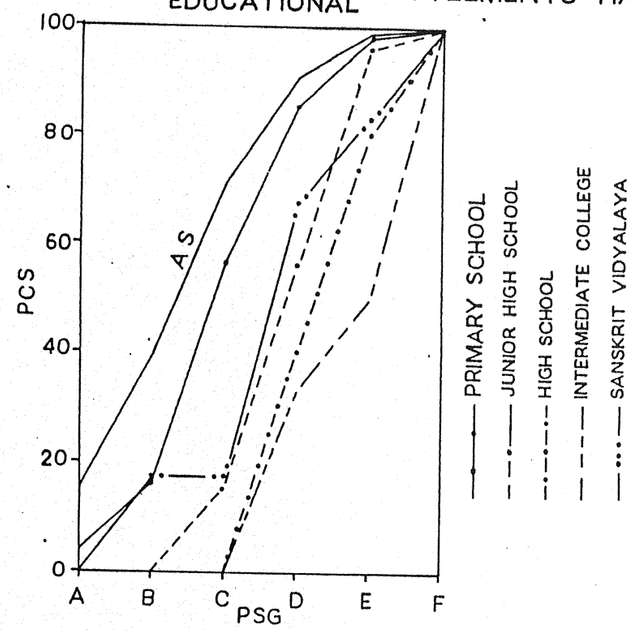
Spatial organisation denotes the arrangement and association of various phenomena and human activities in geo-space. It is viewed as complex system of interrelated distribution pattern of human activities, their interactions and linkages with one another, all involving change and transformation through time[1]. The advanced areas with developed infrastructure had a head start over the backward areas with little or no infrastructure at all. Special schemes for development of backward areas have faltered in the absence of location specific plans for implementing them.

The spatial distribution of socio-economic activities in an area reflects the state of developmental levels of its spatial organisation. Without studying the nature and patterns of distrubution of socio-economic activities and the assessment of their volumetric and quantitative magnitude, no planning approach can be outlined systematically to attain an optimal spatial organisation of economic space. In the present chapter, therefore, an endeavour has been made to present the distributional pattern of important infrastructural pursuits such as education, health, Communication, markets, electricity and agro-economic pursuits, over the space as well as according to the settlement size groups (based on population). Fig. 5.1 presents the distribution of settlements having different functions, in relation to the all settlements.

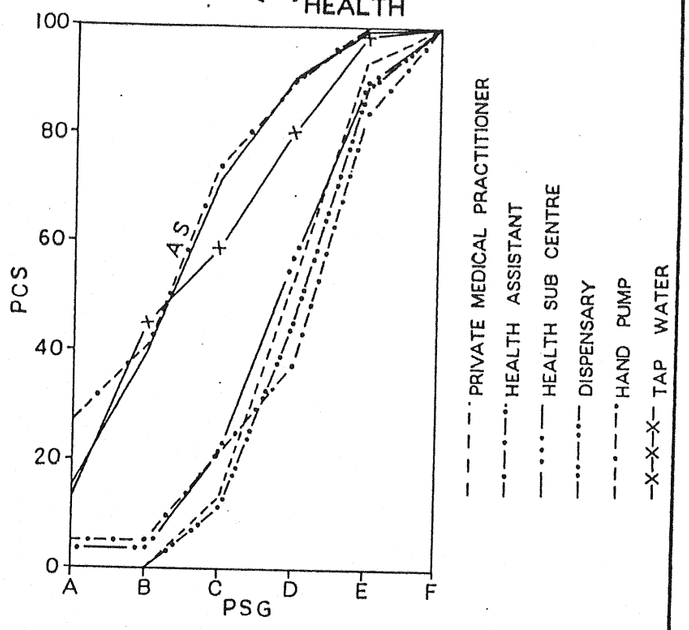
TAHSIL KARWI

CUMULATIVE FREQUENCY CURVES OF ALL THE SETTLEMENTS (AS) AND THE SETTLEMENTS HAVING THE FUNCTION (Sf)

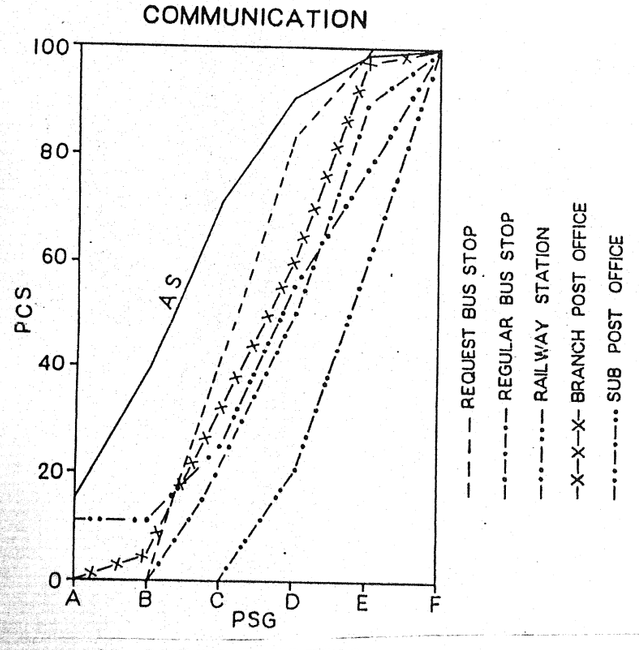
EDUCATIONAL



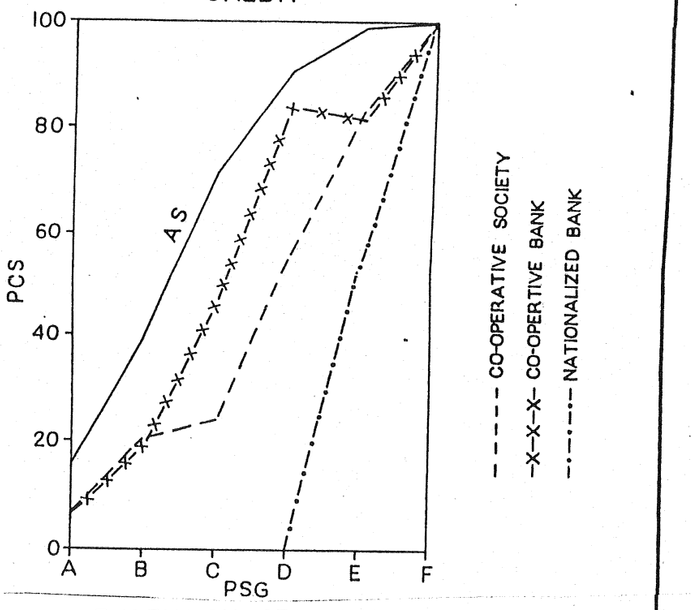
HEALTH



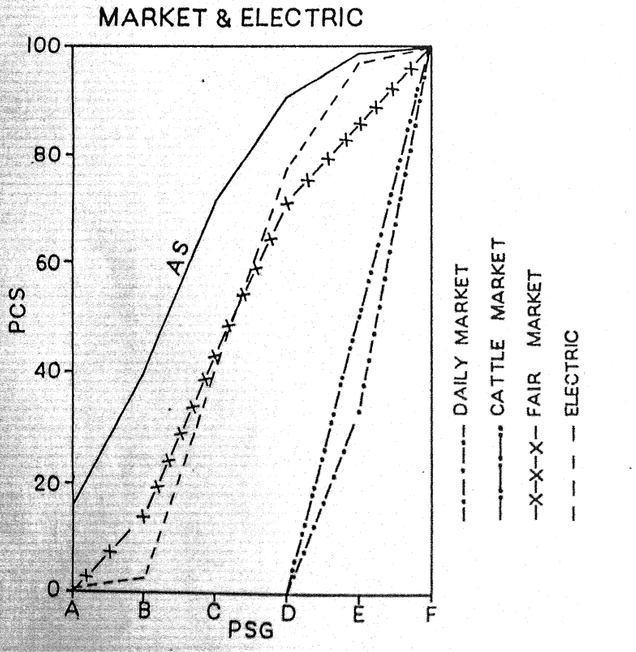
COMMUNICATION



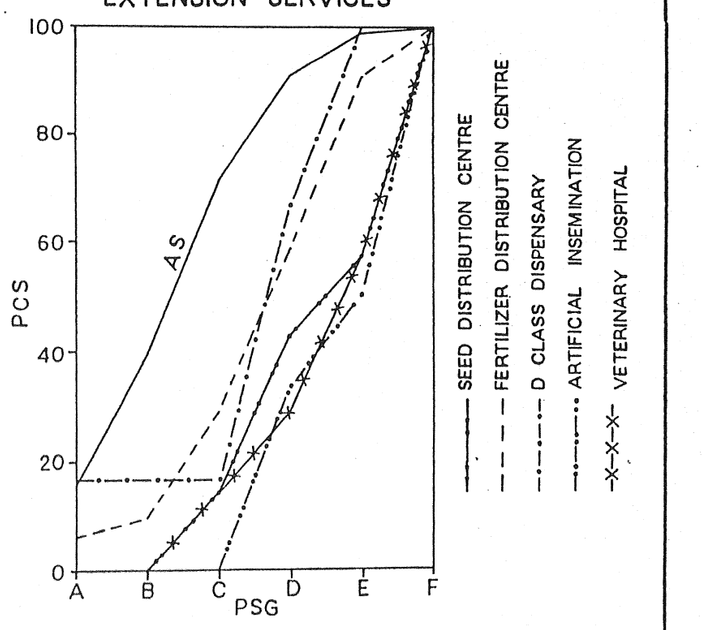
CREDIT



MARKET & ELECTRIC



EXTENSION SERVICES



A - BELOW 200 PERSONS
B - 200 - 499 "
C - 500 - 999 "
D - 1000 - 1999 PERSONS
E - 2000 - 4999 "
F - 5000 & ABOVE "

PSG SIZE GROUP OF POPULATION
PCS PERCENT INHABITED SETTLEMENT

mca

FIG. NO. 5. I

Education

Education is the most important single factor in achieving rapid economic development and in creating social order found on the values of freedom, social justice and equal opportunity[2]. Education which is considered to be a permanent need to individuals, is closely associated with economic and social development of a region. The institutional education is a better way to organise social planning by providing knowledge and skill about development technology[3].

The existing educational structure comprises of its sub-functions like primary school, junior high school, high school, intermediate college and training institute forming five tier hierarchy. Besides, sanskrit vidyalayas significantly contribute to the educational landscape of the area providing education upto post-graduate standard through Sanskrit medium. Except sanskrit vidyalaya, there is no facility for degree education. Similarly, the study area is deprived of technical education facility. Change in the status and number of sub functions results changes in the range of services in terms of area and population both. Hence, it is necessary to observe the distributional pattern of the facilities based on population size of settlements. For the purpose, the rural settlements of the study area have been classified into 6 groups namely A, B, C, D, E and F (Table 5.1).

Table 5.1 : Educational Facilities in Karwi Tahsil (1981)

Settlement size	Number of settlements	Number of Settlements having					
		Primary School	Junior High School	High School	Inter-mediate college	Sanskrit Vidyalaya	Training Institution
A. Below 200	57	9 (10)	-	-	-	-	-
B. 200-400	86	27 (30)	-	-	-	1	-
C. 500-999	116	91 (96)	8 (9)	-	-	-	-
D. 1000-1999	70	66 (88)	21 (22)	2	1	2	-
E. 2000-4999	31	31 (52)	20 (28)	2	1	1	-
F. 5000 & above	1	1	1	-	1	-	-
Total Rural Settlements	361	225 (276)	50 (59)	4	3	4	-
Total Urban Settlements	2	2 (22)	2 (16)	1	2 (5)	2	1
Grand Total	363	227 (298)	52 (75)	5	5 (8)	6	1

Note - Figures in parenthesis denote the number of Institutions.

Sources - 1. Basic Shiksha Adhikari Office, Banda.

2. District Inspector of Schools Office, Banda.

PRIMARY SCHOOLS

Generally, primary schools are said to be ubiquitously distributed, as out of 363 settlements, 227 have primary schools. The total number of primary schools comes to 298 in which 276 are located in rural areas. On an average, there is one primary school for 1150 population. Rampuria inBhaunri cricle is the smallest village (133 persons) having primary school.

The frequency distribution of primary schools among different settlement size groups, however, reveals that in size group 'E' each settlement possesses this facility. In the settlement size group 'D', 94.28% villages have primary schools. Out of 259 villages of population below 1000 persons 50.96% villages are deprived of primary schools. The villages below 200 persons present very poor response, as only 15.78% settlements avail this facility. Over all some larger settlements usually have more than one primary school separately for boys and girls (Table 5.1).

As regards the distribution pattern of primary schools, Karwi circle shows the trend of dispersion while pattern of concentration is observed in Manikpur and Bhaunri circles (Fig. 5.2A).

JUNIOR HIGH SCHOOLS

Junior high schools are less ubiquitous than primary schools and emerge in the study area at population level of 649 persons. In all, 52 settlements have 75 junior high schools, out of which 16 are located in urban areas. Markundi is the smallest village having junior high school. Population pressure on junior high schoolsis 4573 persons per school.

The settlement size distribution of the facility reveals that there are 64.51% villages in settlement -size - group 'E' enjoying junior high school facility while settlement size group 'C' shares lowest percentage (6.89). It is evident that frequency distribution of these schools among different size groups of villages presents fluctuating trend.

Considering the ubiquitous distribution of primary schools, the distribution of junior high schools does not conform to integrated pattern of educational facilities, wherein the choice of a settlement for the location of junior high school would be determined by tributary area located with primary schools.

HIGH SCHOOLS

The distribution of high school in the tahsil is quite meagre and uneven. There is one high school over 68597 persons. Manikpur is the only town having high school for girls. No settlement of population below 1000 persons has

this facility. The maximum occurrence of high schools is observed in settlement size group 'E' having 6.45% villages with high school facility.

INTERMEDIATE COLLEGES

Out of eight intermediate colleges, five are located in urban areas, showing maximum occurrence in CHitrakoot Dham. Chitrakoot Dham (Karwi) is the only urban centre having intermediate college for girls. Population pressure on intermediate colleges is expressed as 42873 persons per college. The villages having intermediate colleges are Bachharan in Pahari circle and Bhaunri and Ainchwara in Bhaunri circle. All these colleges provide educational facilities from sixth class to intermediate level.

TRAINING INSTITUTION AND SANSKRIT VIDYALAYAS

Only one training, school located in Chitrakoot Dham (Karwi), provide training to basic teachers. There are six sanskrit vidyalayas extending educational facilities through sanskrit medium upto post-graduate level. These institutions are affiliated to Dr. Sampurnanand Sanskrit Vishwavidyalaya, Varanasi. No settlement below 200 population possesses sanskrit vidyalaya. The fundamental difference between distribution-pattern of intermediate colleges and sanskrit vidyalayas is that the latter emerge at very low level of population.

TAHSIL KARWI

FACILITIES

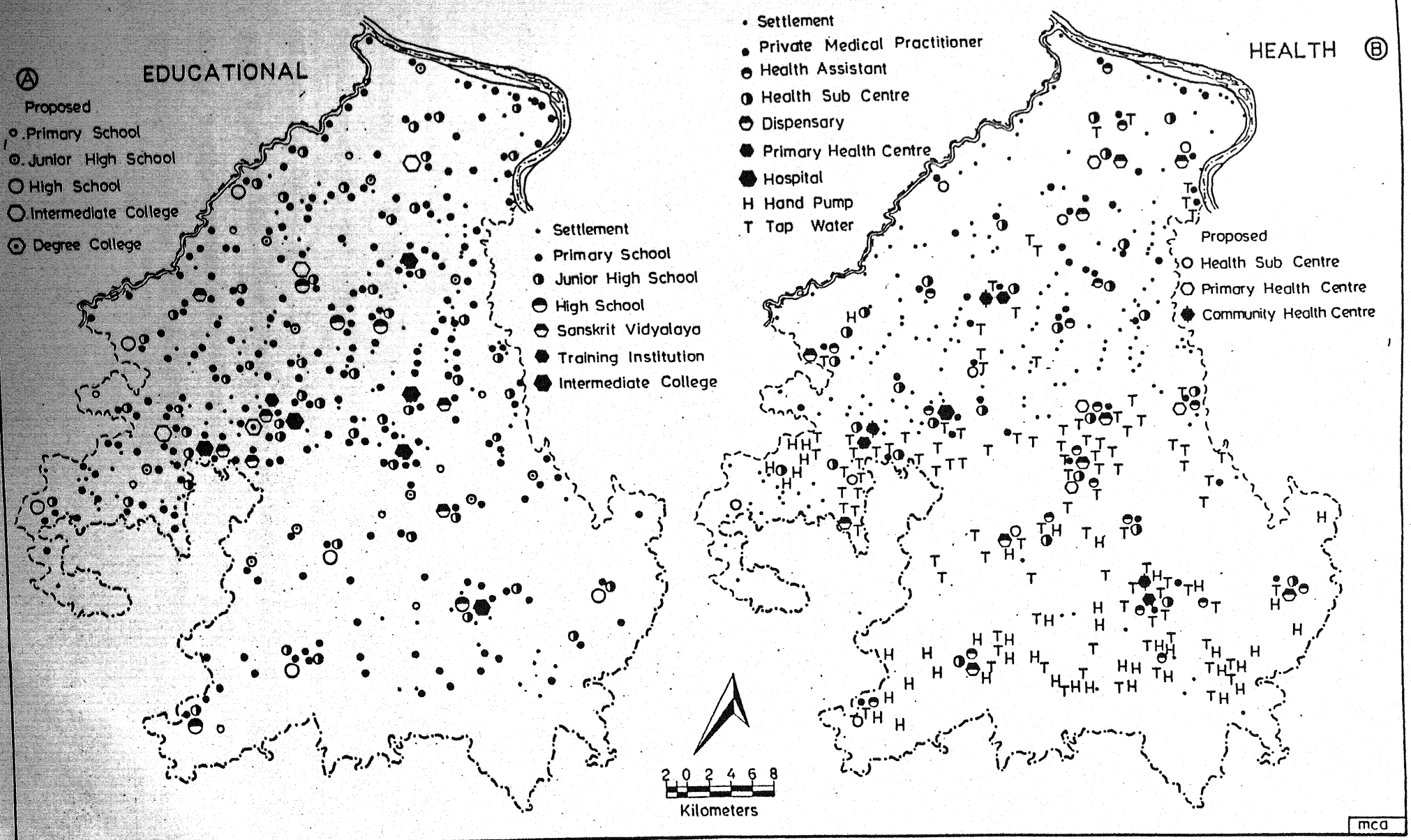


FIG.NO. 5.2

The above provision of formal education may not be considered fully satisfactory. For maintaining the spatial organisation and functional co-ordination, there is an urgent need to fill up the spatial gaps of these facilities, (especially high school and intermediate college) on the basis of centrality with reference to other settlements and areal demands.

Health

Health, which directly affects the well-being and labour productivity of the population, is one of the basic considerations in social planning[4]. It is described as state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.

Human community has been suffering since long from various diseases due to lack of health care facilities. The condition is severe in rural areas where undeveloped transportation facilities discourages people to approach health centres. Illiteracy, conservative behaviour prevailing in rural society and low economic level are some allied factors affecting human health adversely. The development of health care facilities, therefore, must be intrinsically woven into total socio-economic development as the healthy workers produce more for the society than sick workers.

The basic components contributing to regional health system have been grouped as (i) Health care facilities and (ii) Drinking water facilities.

HEALTH CARE FACILITIES

Various health care facilities, existing in the study area, range from private medical practitioner to hospital. The existing health care facilities are far from satisfaction and demand of the people. The distributional pattern of these facilities shows non-ubiquitous nature both spatially and demographically (Fig. 5.2B & Table 5.2).

Private Medical Practitioners

There are 88 private medical practitioners providing allopathic/ayurvedic/homeopathic treatments of which 73.86% are located in rural areas. There is one medical practitioner per 3898 persons. In rurality, only a few doctors have their own clinics and others treat patients at their residence. Due to lack of transport facilities, electricity and other basic amenities, qualified doctors do not prefer to serve in rural areas. Even medical practitioners, the lowest order health facilities, are far from being ubiquitous in comparison with other facilities like that of primary schools. No village of population below 500 has this facility. In settlement size group 'E', 61.29% villages have more than one private medical practitioner. The two urban centres possess

Table 5.2 : Health Facilities in Karwi Tahsil (1981)

Settlement size	Number of settlements	Private Medical Practitioner	Health Assistant	Health Sub-Centre	Dispensary	Primary Health Centre	Hospital	Tap Water	Hand Pumps
A. Below 200	57	-	1 (1)	1 (1)	-	-	-	15	12 (14)
B. 200-499	86	-	-	-	-	-	-	20	6 (11)
C. 500-999	116	6 (6)	3 (4)	5 (5)	1 (1)	-	-	33	15 (31)
D. 1000-1999	70	18 (23)	3 (3)	10 (10)	3 (4)	1	-	28	7 (23)
E. 2000-4999	31	19 (34)	9 (15)	9 (10)	4 (5)	1	-	20	5 (28)
F. 5000 & above	1	1 (2)	1 (1)	1 (1)	1 (1)	-	-	1	-
Total Rural Settlements	361	44 (65)	17 (24)	26 (27)	9 (11)	2	-	117	45 (107)
Total Urban Settlements	2	2 (23)	2 (9)	2 (2)	-	1	1	2	-
Grand Total	363	46 (88)	19 (33)	28 (29)	9 (11)	3	1	119	45 (107)

Note - Figures in parenthesis denote number of facilities.

Sources - 1. Office of the Chief Medical Officer, Banda.

2. Field Survey.

26.14% medical practitioners.

Health Assistants

Health assistants play an important role in the health care system of the area under study. The group comprises Sub-Inspector Malaria, Small-pox Supervisor, Small-pox Vaccinator, House Visitor Malaria, Family Planning Health Assistant, Integrated Child Development Assistant (ANM & LHV) and Trained 'Dais'. In all 19, centres including two urban centres have one or more above mentioned health assistants. Centres of regional as well as local importance have more than one type of health assistants. There is one health assistant working for the population group of 10394 persons. Out of 33 health assistants, 24 are serving the rural community. The settlement size group 'E' shows maximum occurrence of health assistants.

Health Sub-Centres

Health sub-centres are commonly known as family welfare centres (FWC) and maternity and child welfare centres (MCW). These centres perform lower level medical services, essential for rural community. There is one health sub-centre per 11827 persons. The distributional pattern of health sub centres is similar to that of health assistants (Fig. 5.2B). 34.48% of total sub centres is confined at 29.03% villages of group 'E'.

Dispensaries

There are seven Ayurvedic, two Homeopathic and two Allopathic dispensaries, provided with four beds at each centre for indoor treatment. All dispensaries are located in rural areas. Population pressure on dispensaries is expressed as 31180 persons per unit. Markundi (649 persons) is the smallest village having dispensary. The settlement size group 'E', shows concentration of dispensaries in which 45.45% facilities are confined within 12.90% villages.

Primary Health Centres

There are three primary health centres located at Pahari, Manikpur and Sheorampur providing allopathic treatment facilities to the indoor as well as outdoor patients. For indoor treatment, two male and two female beds are provided at each centre. Primary health centre at Manikpur has two extra beds for male patients. These centres have medical staff as well as field staff for conducting immunization programmes and general health survey in the villages.

Hospital

There is only one hospital located at Chitrakoot Dham (Karwi) providing higher order health services to the study area. The hospital consists of two separate units for both males and females. It is provided with three doctors and

14 and 24 beds for indoor treatment of men and women respectively. The hospital is well equipped with 'X'-Rays plant and pathological laboratory. A dental care unit and leprosy control unit are also attached with the hospital. Besides, one post of child specialist is to be filled shortly as per Government sanction.

In addition to above health care facilities, for the promotion of child health in rural areas, Child development project named 'Anganbari' is under execution in the Manikpur block of the study area. Under the project, 50 centres have been established in the supervision of one Project Officer at Manikpur.

It reveals that there is high degree variation in the distribution of health facilities in rural and urban areas. The distribution of these facilities among villages seems to be arbitrary and affected by local politics. Some spatial gaps between facilities invite proper attention to make the system more feasible.

DRINKING WATER FACILITIES

Provision of safe and adequate water supply is basic necessity of the healthy living of human society. The vast masses of rural population fulfil their drinking water demand from open wells, rivers, rivulets and tanks, which are liable

to contamination, causing water born diseases. The unsafe and polluted drinking water in rurality is continuously affecting the mortality rate and damaging the health of crucial age groups. Consequently, the productive capacity of the rural working force is being crippled. Hence, the study of drinking water facilities, as an infrastructure, is utmost important in the view of integrated area development.

The southern part of the study area (known as Patha) consists of Manikpur circle and some parts of Bhaunri and Karwi circles. Patha area is a drought prone and worst affected water scarcity area of Uttar Pradesh. In addition to the acute shortage of drinking water in the months of summer, the meagre water which is available in the area is hard and contaminated.

Drinking Water Supply Schemes

At present, the study area is served by three drinking water supply schemes. In order to solve the drinking water problem, in 1974 Asia's largest scheme named 'Patha Area Rural Water Supply Scheme' was executed with capital investment of Rs. 196.68 lakhs. The scheme, consisting of four units i.e. Karwi, Semardaha, Manikpur and Pahari, supplies water to 117 villages and two towns for 158774 persons (1971). Really, it is a paradox that in the presence of such a huge water supply scheme, people are still facing acute shortage

of drinking water due to the wrong policy of State Government and the negligence of the Jal Nigam[5].

Another rural water supply scheme named as 'Surgen Water Supply Scheme' was executed in 1976. Surgen and Bardwara villages are served by the scheme. It provides drinking water facilities to 4391 persons with 130 water connections. Besides three villages of the study area i.e. Raipur, Beraur and Chilly are served by 'Rajapur Water Supply Scheme' functioning since 1965. Total number of connections in these villages is 23.

The aforesaid drinking water supply schemes are facing a number of problems. Most of the villages are equipped with stand posts. These stand posts serve no purpose as their supply is irregular and meagre. Only a few people in large settlements have their private connections. General rural community is not in a position to afford high water tax burden. Some tail points due to loss of water pressure do not get sufficient water. There is a great need to educate the benefits of pure and safe water to the rural people.

Installation of Hand Pumps

Drinking water supply schemes are partly contributed by hand pumps, being installed in water scarcity areas and maintained by Jal Nigam. There are 107 hand pumps in the

patha area serving 45 villages. The hand pump system of safe drinking water supply supersedes over pipe distribution system as the maintenance costs of hand pumps is nominal and it is free from various distributional and technical anomalies.

Distribution of Settlements having Drinking Water Facilities

Over all 119 settlements are supplied with tap water facility. The high occurrence of villages having tap water facility is observed in settlement size group 'E' in which more than 60% settlements possess this facility. The settlement size distribution of hand pumps shows that the largest number of hand pumps (31) is confined within settlement size group 'C' (Table 5.2). Spatially speaking, the installation of hand pumps is limited in Manikpur circle and water scarcity zone of Karwi circle whereas tap water facility is extended to the villages of Manikpur, Karwi and Bhaunri circles. Besides, villages of Pahari, Nandi and Sardhua circles also enjoy the tap water facility (Fig. 5.2B).

Communication

Communication serves as a very effective, powerful and direct measure for the regional development. The transformation of rural society could be accelerated by communication media. As the communication system is both an index and agent of change in a total system, therefore, it must be swift

in the areas where new economic activities are being developed over and above the old one. The inadequate communication facilities have resulted primitive type of economy and low standard of living of the people in the area under study.

Communication has been ascribed as the means of passage from one place to another, not only of the ideas but also of the material things. Here, the scope of communication has been extended to its general limits of exchange of ideas and it has been sub divided as - (i) Postal facilities and (ii) Transport facilities.

POSTAL FACILITIES

Post Office is the part of infra-structural facilities in rural as well as urban areas. In country like India, the post office is not only the agency for communication of written message but also one of the principal agencies for transactions of small sums of money for which it is, in fact, practically the only means[6]. The post offices, as banking establishments mobilise the small savings of the average man.

The postal facilities include branch post offices, branch post offices with telephone facility, sub-post offices, post and telegraph office and telephone exchange. All sub-post offices and branch post offices with telephone

facility are provided with telegraph facility also. These are, therefore, treated as post and telegraph offices. Transport plays an important role in the location of postal facilities in the study area (Fig. 5.3A).

Branch Post Office

Out of 363 settlements, only 44 have branch post offices. There is one branch post office over 7795 population. The distributional pattern of branch post offices reveals that they occur in the villages of more than 200 population. Raipurwa is the smallest village (310 persons) provided with branch post office facility. The maximum concentration of branch post offices is observed in settlement size group 'E' in which 54.83% settlements possess this facility (Table 5.3). There are four rural settlements having branch post offices with telephone facility. These centres offer telegraph facility in addition to general postal facilities.

Sub Post Offices

The sub post offices, extending, post and telegraph facilities to its vicinity, are rare. There are 7 sub post offices located in 5 centres. On an average, one sub-post office serves 48998 population. The smallest village that has sub post office is Sheorampur (1353 persons).

In addition to above postal facilities a telephone exchange located at Chitrakoot Dham (Karwi) constitutes a

TAHSIL KARWI

FACILITIES

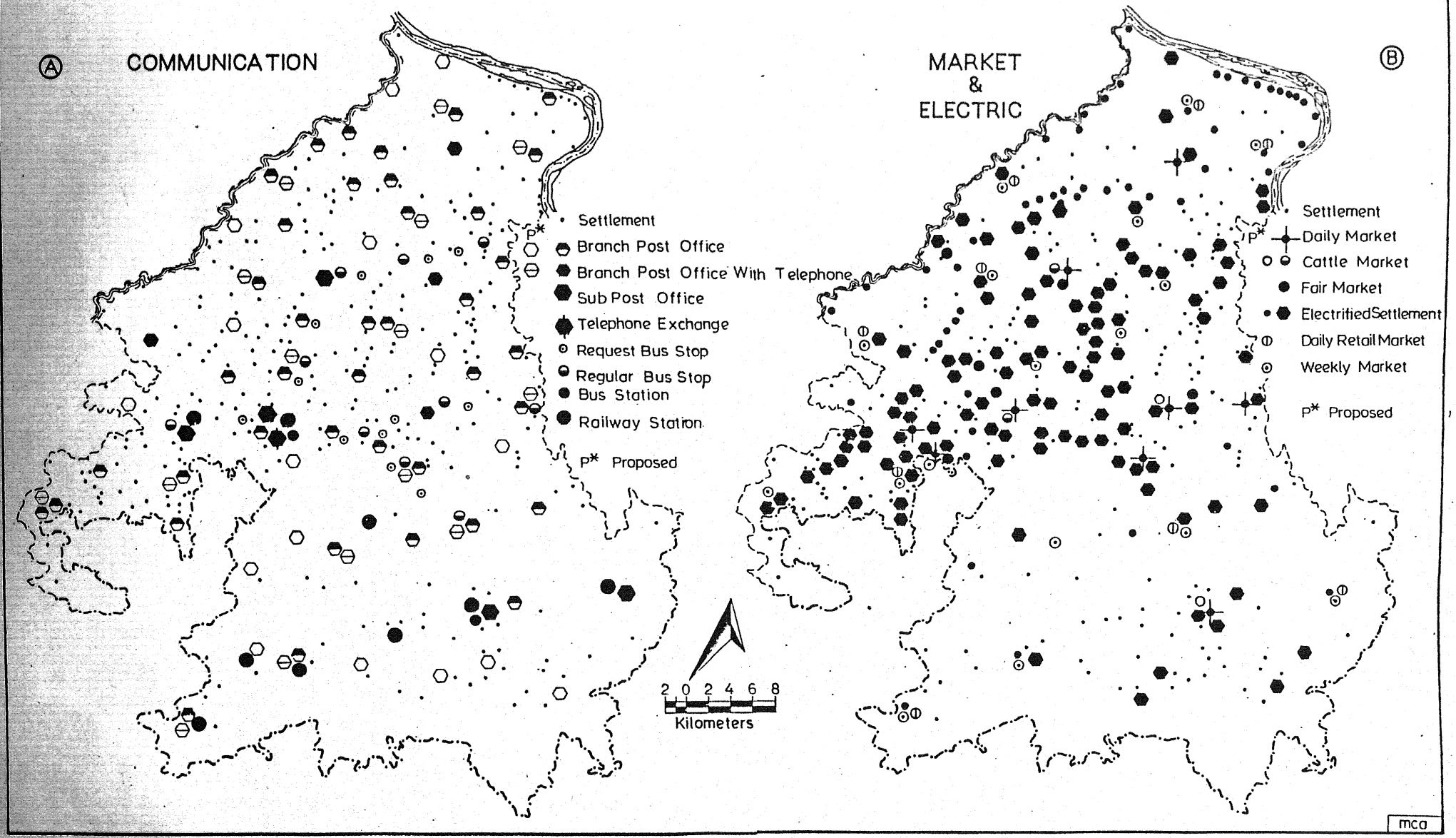


FIG.NO. 5.3

Table 5.3 : Communication Facilities in Karwi Tahsil (1981)

Settlement size	No.of settlements	Number of settlements having						
		Branch Post Office	Sub Post Office	Telephone Exchange	Request Bus Stop	Regular Bus Stop	Bus Station	Railway Station
A. Below 200	57	-	-	-	-	-	-	1
B. 200-499	86	2	-	-	-	-	-	-
C. 500-999	116	11	-	-	5	2	-	1
D. 1000-1999	70	12	1	-	5	3	-	3
E. 2000-4999	31	17	2	-	2	4	-	2
F. 5000 & Above	1	1	-	-	-	1	-	-
Total Rural Settlements	361	43	3	-	12	10	-	7
Total Urban Settlements	2	1	2(4)	1	-	-	2	2
Grand Total	363	44	5(7)	1	12	10	2	9

Note: Figures in parenthesis denote number of facilities.

Sources - 1. Office of the Inspector Post Offices, Karwi (Banda).
2. Office of the Station Superintendent U.P.S.R.T.C., Karwi.
3. Field Survey.

main part in the communication system of the area under study. Transistors are quite common means of information and entertainment for the rural population. Prevalence of news papers and televisions in the villages is almost nil due to poverty, illiteracy and lack of transportation.

TRANSPORT FACILITIES

The transportation involves the purposeful movement of people and goods. Socio-economic development of an area is completely depended on quick and efficient transportation network, therefore, it is considered as an important aspect in all the planning processes. The economic vitality of a region flows through transport network and economic equilibrium and exploitation of available resources are greatly facilitated through its adequate development[7]. Thus spatial organization of any region can be described in terms of transport network, traffic flow pattern etc.

Structure of Transport Network

The existing transport network of Karwi tahsil, mainly consists of (i) railways and (ii) roads.

The Railways - The historical development of railways in the study area is traced out with the construction of first railway line (Jhansi-Manikpur section) in 1885-87 by Indian Midland Railway Company. Nowadays Central Railway forms

the railway network of the study area. Jhansi-Manikpur and Allahabad-Katni via Manikpur are two railway sections of the area under study. The area served by these railways is small but linkage relationship is significant as the railways provide linkages to the centres of regional importance such as Delhi, Kanpur, Jabalpur, Allahabad etc.

There are 9 railway stations serving the area with 100.75 Kms railway line. The rail density, as observed in the study area is 42.91 Kms/1000 Km^2 and 29.37 Kms/100000 persons which is higher than the district figure (26.16 Kms/ 1000 Km^2 and 13.02 Kms/100000 persons). The rail density in terms of per station area measures to 260.86 Km^2.

The settlement size distribution of railway stations is presented in table 5.3. Bahilpurwa (191) is the smallest village having railway station.

The Road Reticule - The road reticule is the backbone of spatial interaction in the rural areas. Being a significant factor in spatio-functional organization of an area, it has been considered vitally by integrated area development planners. Road transport has attained a most important role in the economy of the life today as bulk of regional traffic is depend upon it.

The study area has witnessed a radial pattern of road

network. Chitrakoot Dham (Karwi) is the nodal point for road transport providing linkages to district headquarter Banda (70 Kms), Allahabad (120 Kms), Manikpur (32 Kms) and Rajapur (34 Kms). On the basis of existing surface conditions, roads of the study area can be classified as (i) metalled roads, (ii) roads under construction and (iii) unmetalled roads (Fig. 5.4A).

Metalled roads - Total road length under study area comes to 118.78 Kms. Road density in terms of Kilometerage of roads per 1000 Km^2 is recorded as 50.6 Kms which is lower than the district road density (106 Kms). Similarly the road Kilometerage per 1,00,000 population is also lower (34.63) in the study area in comparison to the district (52.59). Jhansi-Mirzapur (State Highway 44) is the main road passing through Sheorampur, Chitrakoot Dham (Karwi), Bhaunri and Raipura, Passing from west to east, the highway divides the region into two equal parts. The other metalled roads of the study area are: Karwi-Pahari-Rajapur (34 Kms), Pahari-Jariha (4 Kms), Khoh-Manikpur (23 Kms), Karwi-Dewangana (6.85 Kms), Chitrakoot feeder road (3.9 Kms) and Bharatkoop station to Bharatkoop temple (2.45 Kms). There are two link roads from Karwi-Rajapur road to Lorhwara and Asoh villages.

Road Under Construction - In tahsil Karwi, total length of under construction roads comes to 156.9 Kms (Table 5.4).

TAHSIL KARWI

TRANSPORT

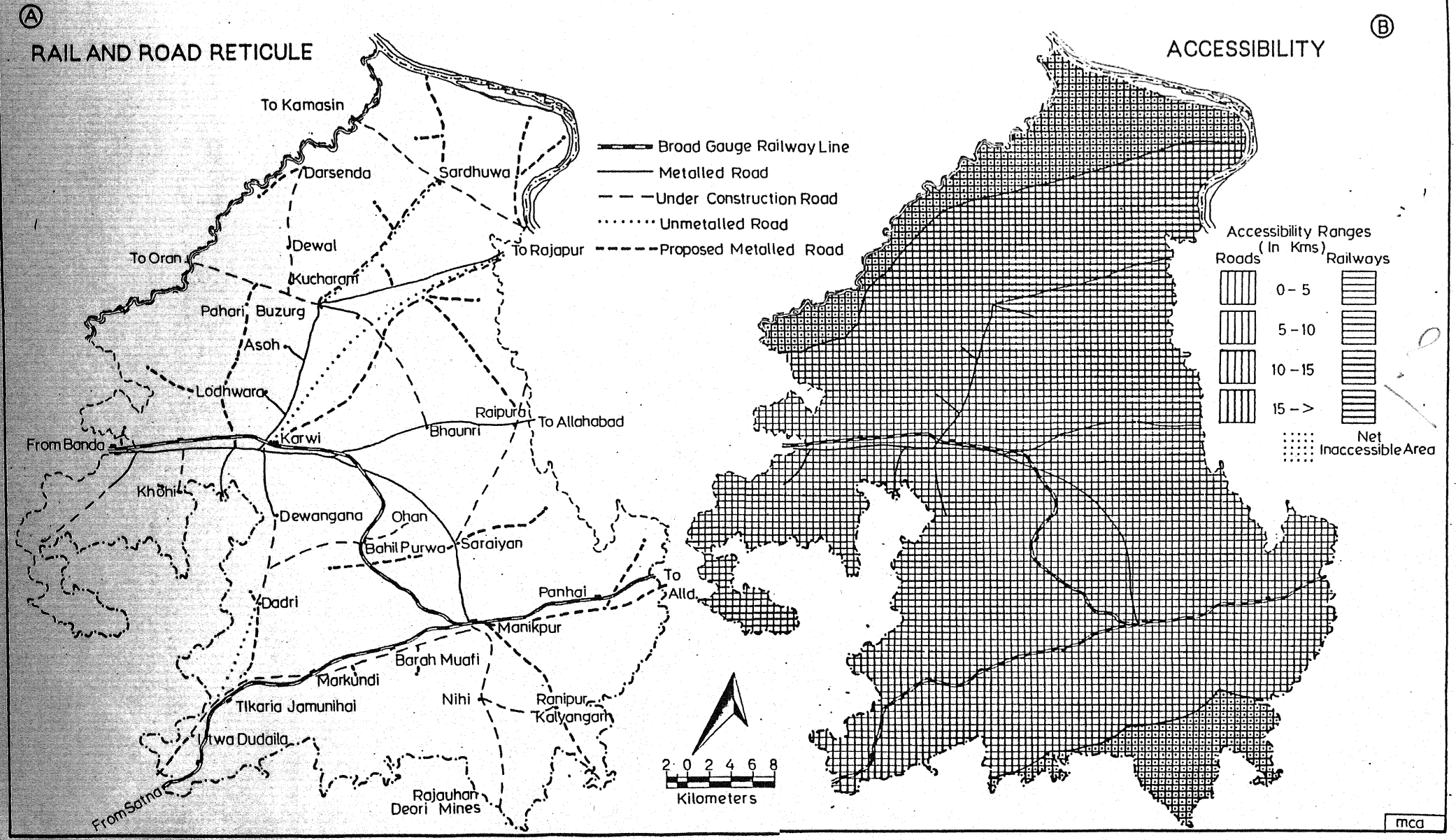


FIG.NO. 5.4

Table 5.4 : Under Construction Roads (1981)

Name of Road	Length within Study Area (Kms)
1. Rajapur-Kamasin (Part)	18.0
2. Rajapur-Raipura-Saraiyan	16.0
3. Kucharam-Dewal	12.8
4. Pahari-Cran-Bisanda (Part).	12.2
5. Bhaunri-Nandi Taura	8.4
6. Sheorampur-Khohi	5.0
7. Bharatkoop-Manpur Marka	12.0
8. Dewangana-Dadari	12.8
9. Bahilpurwa R.S. - Dadari	9.0
10. Bahilpurwa R.S.- Oran	5.0
11. Manikpur-Markundi-Itwa Dudiala	32.0
12. Manikpur-Rajauha-Deori Mines	18.0
13. Nihi-Manikpur	7.0

Source - Office of the Superintendent of Works,
P.W.D., Karwi.

These roads, when completed, will provide better linkages among the important rural centres.

Unmetalled roads - Pahari-Sardhua, Karwi-Rajapur via Budha and Dadari-Itwa Dudaila are three important unmetalled roads. A number of unmetalled link roads have emerged under the government scheme of food for work. They connect the settlements to their respective roads.

Traffic Flow

Arterial framework and flow of traffic there on, are two close and complementary aspects of the transport system. The traffic of any region reflects the complexities of economic interdependence and thus serves the base of circulation system.

Railway traffic flow - It has been observed that Manikpur being the junction of Jhansi_Manikpur and Allahabad-Katni sections of Central Railway bears heavy traffic load. Manikpur enjoys the facility of 9 trains (2 passengers and 7 mail) express trains, each up and down side) on Allahabad-Katni section and 4 trains (2 passengers and 2 express trains, each up and down side) on Jhansi-Manikpur section. Chitrakoot Dham Karwi and Sheorampur are the important stations of Jhansi-Manikpur section with express train stopping facility. Average daily out-flow of the passengers at Chitrakoot Dham Karwi was 906 and 1114 passengers in 1980 and 1981 respectively.

Volume of goods traffic flow like that of passengers flow is also considerably higher at Manikpur station. The monthly goods trains flow (up and down) on Manikpur-Jhansi line is 204, on Manikpur-Katni 182 and on Manikpur-Allahabad 25 trains. In Manikpur monthly average of vagons loading and unloading is 30. Tendu leaves, bauxite, firewood and bamboo are main exporting commodities while tobacco for biri manufacturing is the main imported item. Chitrakoot Dham (Karwi) secures higher place in trade through railways. In the station, monthly loading/unloading of 35 Wagons is recorded. Gram, arhar, stone-grit and tendu leaves form the major part of exporting commodities while salt, gur and cotton are main inward commodities.

Road traffic flow - Spatial interaction of an area is more affected by roads than rails. To reach at their destinations comparatively easier and earlier, people prefer bus journey. Chitrakoot Dham (Karwi), being a nodal place, largest town and an administrative centre, records highest frequency of both incoming and outgoing buses as well as passengers. It is linked by direct bus service with Allahabad, Varanasi, Faizabad, Lucknow, Kanpur, Mahoba, Rath, Sagar, and Chhatarpur. The higher volume of passengers traffic flow on Karwi-Banda road is supported by number of buses on the route.

Trucks play significant role in the flow of goods by

roads. There are 4 transport agencies functioning at Chittrakoot Dham (Karwi). The Union Transport is the largest transport agency having movement of 8 trucks per day. The movement frequency of other agencies is 15 trucks per month. The nature of goods transported by trucks is more or less same as by trains. People prefer the trucks for the movement of their goods due to irregularity and insecurity in train services.

Accessibility

Accessibility is the index of socio-economic development of a region and indicates the effectiveness of transport cover as both cause and result overall development[8]. It shows the degreeof development of a transport network. The study of accessibility is a successful tool for transport planning of an area.

Accessibility is always relatively described. In fact, because of men's endeavour there is no place really inaccessible but in the present study, the area lying beyond 10 Kms of a transport artery has been considered as inaccessible. As the rails and roads are two significant means of transport, the accessibility has been examined pertaining to four aspect such as (i) Physical accessibility by rail, (ii) Physical accessibility by road, (iii) composite accessibility and (iv) relative accessibility.

Physical accessibility - The physical accessibility has been measured by drawing isodromes of 5, 10 and 15 Kms along roads and railway stations. Although the true distance is influenced by many factors such as the individual preference, the availability and cost of alternative means of transport, the 10 Kms distance from transport artery has been considered as accessible.

The study reveals that 56.66% of total area is accessible by rails. The accessibility by road is higher (68.55%) than rail accessibility. The highly accessible areas lying within 5 Kms from transport artery report 27.60% in case of railways and 39.47% in case of roads. The highly inaccessible areas (beyond 15 Kms) cover 27.87% and 11.12% by rails and roads respectively (Table 5.5).

Table 5.5 : Physical Accessibility by Railways and Roads

Accessibility Zone	Area (Km^2)	% of total area
(i) Accessibility by Railways		
(1) Area within 5.0 Kms.	633.83	27.00
(2) Area within 5-10 Kms.	696.33	29.66
(3) Area within 10-15 Kms.	363.28	15.47
(4) Area beyond 15 Kms.	654.39	27.87
(ii) Accessibility by Roads		
(1) Area within 5.0 Kms.	926.55	39.47
(2) Area within 5-10 Kms.	682.61	29.08
(3) Area within 10-15 Kms.	477.39	20.33
(4) Area beyond 15 Kms.	261.27	11.12
(iii) Net Accessibility		
(1) Accessible Area (within 10 Kms)	2121.23	91.35
(2) Inaccessible Area (beyond 10 Kms)	226.60	9.65

The composite physical accessibility has emerged by superimposition of both maps of rail and road accessibility. Only 9.65% area is net inaccessible area. The patches of inaccessible areas are observed along the Baghain and the Yamuna rivers and in the upland forested area of the south (Fig. 5.4 B).

Relative accessibility - It is the dynamic aspect of accessibility and can be measured in terms of time and cost distances from regional centre to its surrounding places. The speed of travel, degree of traffic congestion, frequency of traffic jams, directness of routes are some of the important causes which influence the relative accessibility[9]. Chitrakoot Dham (Karwi), being centrally located place, shows highest relative accessibility which is linked with rails and roads to the surrounding areas.

Out of total 363 settlements, 10 are sited at regular bus stop while 12 others are located near request bus stop. The frequency distribution of settlements having bus stop facilities forms idefinite pattern. The villages irrespective of theirpopulation, enjoy the road side location. Both urban centres i.e. Chitrakoot Dham (Karwi) and Manikpur are provided with bus station (Table 5.3).

Electricity

Electricity is no longer an amenity but a powerful tool

for economic well-being. Electric power plays a vital role in the agricultural development of a region. Rural electrification has brought about significant changes in the methods of irrigation and cropping pattern. It has created environment for rapid growth of commerce and industry. In an area like Karwi tahsil, rural electrification offers the most promising means of raising income, generating employment and spreading prosperity.

History of electrification in the study area begins from 1965-66 with construction of one 66 K.V. hydel power station at Banda which was connected by 66 K.V. line with Matatila power house. The study area is connected by 33 K.V. transmission line with Banda and 132 K.V. line with thermal power station at Sirathu (Allahabad). 132 K.V. and 33 K.V. power stations are located at Chitrakoot Dham (Karwi) and Manikpur respectively. The main centres are connected by 33 K.V. and 11 K.V. transmission lines.

RURAL ELECTRIFICATION

Before event of hydro electric power, there was no village having electricity. Upto 1970, there were 49 electrified villages in the study area. Out of 361 rural settlements, only 107 have electric facility. 72.90% of total electrified villages possess the electric connections for irrigational and industrial purposes, while remaining villages enjoy domestic

as well as industrial and irrigational connections.

The distribution of electrified villages based on settlement size shows that only three villages of population below 500 persons possess electric facility. Settlement size group 'E' exhibits the high concentration of electrified villages in which 67.74% villages are electrified (Table 5.6). The distribution of electrified villages shows close correspondence with cultivated area (Fig. 5.3B).

Table 5.6 : Electric Facility in Karwi Tahsil (1981)

Settlement Size	Number of Settlements	Number of Electrified Settlements	Percentage of total Settlements
A. Below 200	57	1	1.75
B. 200-499	86	2	2.32
C. 500-1999	116	42	36.21
D. 1000-1999	70	40	57.14
E. 2000-4999	31	21	67.74
F. 5000 & above	1	1	100.00
Total Rural Settlements	361	107	29.64
Total Urban Settlements	2	2	100.00
Grand Total	363	109	30.02

Source - 1. Office of the Assistant Engineer, Karwi Sub-Division, Karwi (Banda).

In the study area, return investment on rural electrification is generally low. This is because of the fact that villages are f lung apart and transmission lines have to be taken to long distance for comparatively small load. Besides, the power consumption in rural areas is seasonal in character and over-all utilization is very low. The benefit flowing out of rural electrification are to cluster on group of villages where specific loads like pumpsets are readily available considering the huge investment involved in rural electrification[10].

Markets

The market centres are focal points which radiate technological knowledge and other informations related to the development. These centres export the surplus products to outside the area and supply deficit goods within the area. In fact, markets are those viable locations that deal with movement of man and supply of finished goods among settlements on the one hand and boost the scope of input management for the production sector and good provision of social services, facilities and amenities for public on the other[11]. The spatial organization of market facilities, however, is one of the most important factors to determine the economic orders of the regions and the structure, size, functions and the space relationships of the settlements.

On the basis of the periodicity, the markets of the study area have been classified as : (i) Daily Markets and (ii) Periodic Markets.

DAILY MARKETS

The daily markets are important places which act as nodal centres more efficiently than the centres without market facilities. In these markets, the activities of selling and purchasing are performed by traders daily. As the study area is deprived of weekly market facility, the role of daily markets in the business activities of the area is of utmost significance.

Chitrakoot Dham (Karwi) is the largest market centre, dealing with wholesale as well as retail business. The main marketed commodities are pulses, oilseeds, cloths, machineries, domestic goods and articles of common use. Karwi is the main daily vegetable market centre which fulfils the vegetable requirement of the whole study area and contiguous tahsils. Sitapur is another centre of daily vegetable market dealing with wholesale business. Manikpur is second largest market centre of the study area which is specialized in business of forest products on wholesale basis.

The highest number of settlements (4) located with daily markets lies in settlement size group 'E'. No

settlement having population below 1000 persons possesses this facility (Table 5.7). The centres of daily markets are located along main roads (Fig. 5.3B). Besides, a number of hawkers satisfy the demand of rural community. They move village to village carrying with cloths, readymade garments, aluminium utensils, cosmetics and articles of domestic use.

PERIODIC MARKETS

Apart from permanent commercial activities, there are other activities which, though periodical in nature, have been of great importance in the economic and commercial life of the area. The periodic markets of the study area have been grouped as under :-

(i) Cattle markets and (ii) Fair markets.

The cattle markets are weekly in nature and hold on each Thursday and Saturday at Chitrakoot Dham (Karwi) and Pahari respectively. Fairs are the important centres of religious and cultural activities and perform economic functions of utmost importance. There are 6 places where fairs are held once or more than once during the year. (Fig. 5.2B). All the fairs are religious in nature but play an important role in the business activities of the area. The fairs are based on religious rituals and festivals with little consideration of population base. On the day of every new moon fair is held at Chitrakoot. Other fair markets are

Table 5.7 : Market Facilities in Karwi Tahsil (1981)

Settlement size	Number of settlements	Number of Settlements having Daily Markets	Cattle Markets	Fair Markets
A. Below 200	57	-	-	-
B. 200-499	86	-	-	1
C. 500-999	116	-	-	2
D. 1000-1999	70	2	-	1
E. 2000-4999	31	4	1	1
F. 500 & above	1	1	-	-
Total Rural Settlements	361	7	1	5
Total Urban Settlements	2	2	1	1
Grand Total	363	9	2	6

Source - Field Survey.

Pahari, Bandhuin, Sainpur, Barwara and Bagrehi where annual fairs are organised.

Agro-economic Pursuits

The agro-economic pursuits of any region are the functions of procutive use, and thus strengthen the structure of regional economy. The agro-economic pursuits of the study area may be classified as under :-

(i) Agricultural pursuits and (ii) Credit pursuits.

AGRICULTURAL PURSUITS

Agricultural pursuits refer to such infrastructural provisions which can lead the advancement in agricultural economy and include mainly irrigation systems and extension services.

Irrigation System

Agriculture, the main stay of rural economic life suffers from inadequacy and insufficiency of irrigational facilities. Only 14,28% of net area sown is under irrigation. The percentage distribution of irrigated area shows variable pattern. It is highest in Parsaunja (22.60) and lowest (8.38) in Pahari circles. The canals and wells are the principal components of irrigational system of the study area. Other sources of irrigation are tanks, ponds and bunds. Canal irrigation dominates in Sardhua and Parsaunja circles while wells and tube wells possess special significance in Karwi circle. Tanks and bunds are the common features of the southern upland (Fig. 5.5A).

Canals - Canal, the cheapest means of irrigation, irrigates 84.61% of total irrigated area of the region. Out of total irrigated area (by canals), Parsaunja circle shares largest percentage (29.92) followed by Sardhua (18.90%) and Bhaunri (18.13%) circles. Pahari and Karwi circles sharing 3.57% and 5.90% of irrigated area respectively are at lowest rung.

TAHSIL KARWI

IRRIGATION

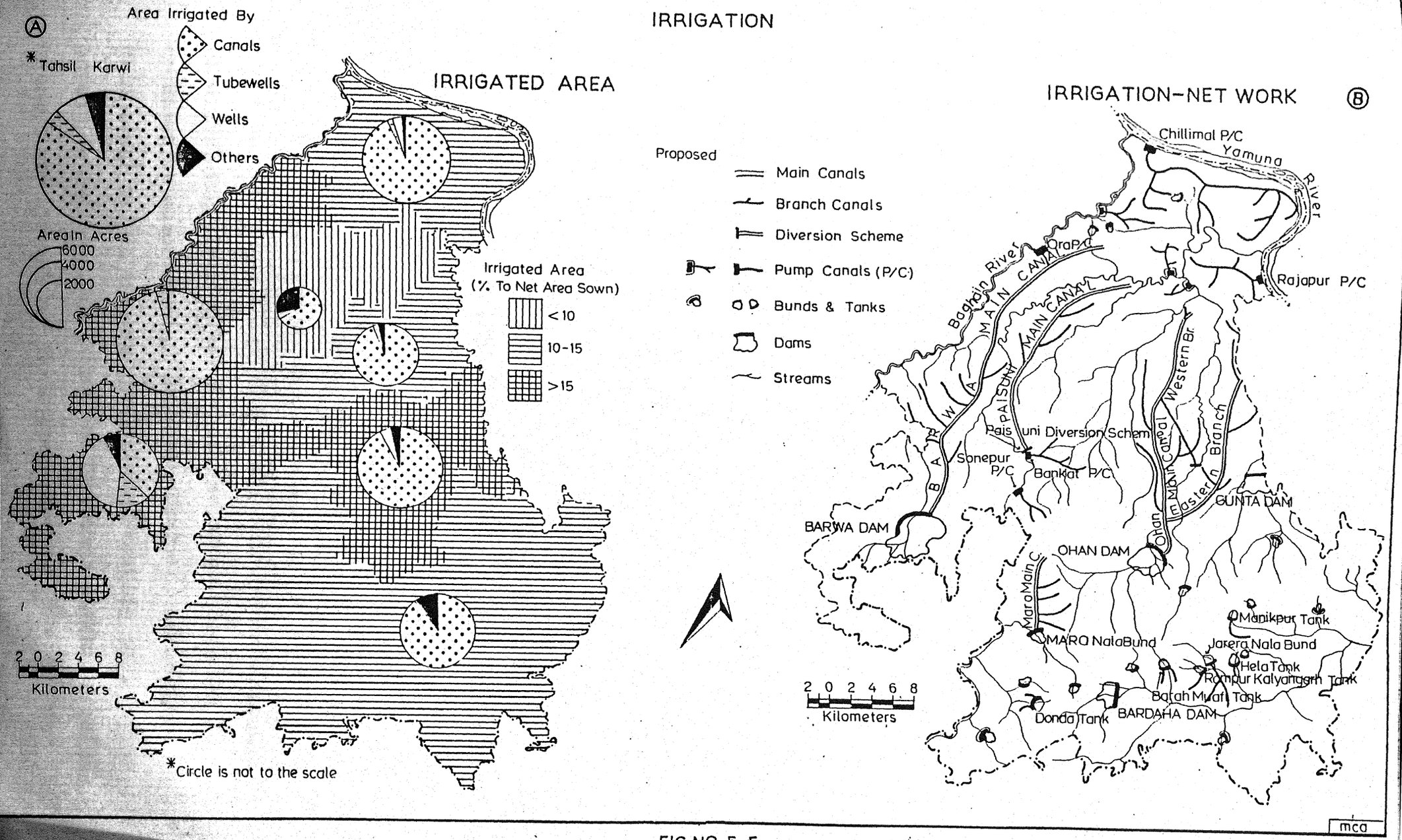


FIG.NO. 5.5

The total length of canals under study area is 870 Kms. The canals system of the area may be classified as under -(Fig.5.5B)

(i) Canals from Dams,

(ii) Canals from tanks and bunds and

(iii) Lift canals.

(i) Canals from Dams

Ohan Canal System

It is the most important canal system of the area. The total length of distribution system is 125.147 Kms and capacity of reservoir is 1354 m.c.ft. The canal system was developed by constructing a dam of 2.4 kms length across the river Ohan, near Semardaha village. The discharging capacity of main canal (4.8 Kms) is 135 cusecs. The culturable command area of the system is 45318 acres. The system proposes to irrigate 12071 acres area of Bhaunri, Nandi and Pahari circles.

For the successful functioning of Ohan system, Ohan feeder (8.3 Kms) has been developed by constructing tank near village Barkol.

Barwa Canal System - It is the second largest irrigation system of the area. A reservoir of capacity 880 m.c.ft. has been constructed with the help of a dam of 2.8 Kms length on Barwa nala near village Bharthaul. The system consists of 69.795 Kms distribution channels of which 38.22 Kms is ascribed as main canals. The water discharge capacity of main canal is 181 cusecs. The cultural command area (40952 acres) is extended over Karwi and Parsaunja circles situated between the Paisuni and the Baghain rivers. The system

propounds to irrigate 9288 acres and 4212 acres land under kharif and rabi crops respectively.

The Paisuni diversion Scheme - The scheme consists of 26.6 Kms main canal having water discharge of 70 cusecs. The system has been developed by constructing a tank along the Paisuni near village Bankat to irrigate 7731 acres land of Parsaunja and Pahari circles. The cultural command area of the scheme is 17535 acres.

(ii) Canals from tanks and bunds - The study area, specially the southern part is dotted with a number of bunds and tanks. Some large size bunds and tanks are being used as reservoirs for development of small canals. These canals cover 14111 acres cultural area and propose to irrigate 6592 and 1528 acres area under rabi and kharif crops respectively. The salient features of the canals outleted from small bunds and tanks are given in Table 5.8.

(iii) Lift Canals - In addition to gravity canals, a number of lift canals have been developed to fulfil the agricultural water requirement. The existing lift canals of the study area are Ora pump canal, Chillimal pump canal, Rajapur pump canal and Sonepur pump canal. These are electric pump canals.

The length of lift canals in the study area is 116.33 Kms., covering cultural command area of 41293 acres. The lift canal

Table 5.8 : Salient Features of Canals (Outleted from Bunds and Tanks)

Sl.No.	Name of Bunds/Tanks	Capacity (m.c.ft.)	Discharge (Cusecs)	Length of Distribution System (Kms.)	Cultural command area (acres)	Proposed Irrigated area (acres)	
						Kharif	Rabi
1.	Maro Nala Bund	238.5	24.0	11.23	5704	928	2500
2.	Jarera Nala Bund	95.0	7.5	9.34	1782	600	900
3.	Manikpur Tank	71.0	9.0	3.6	1635	-	755
4.	Hela Tank	53.0	6.0	1.6	980	-	491
5.	Rampur Kalyangarh Tank	65.7	3.5	3.0	1775	-	841
6.	Barah Muafi Tank	60.0	3.5	4.2	1360	-	630
7.	Donda Tank	31.7	4.0	3.5	875	-	475

Source - Unpublished Record, Office of the Executive Engineer, Irrigation Division I, Banda.

system propounds to irrigate 17893 and 23835 acres area under Kharif and rabi crops respectively (Table 5.9).

Wells - Wells are the second important source of irrigation. There are 3547 wells in Karwi tahsil, sharing 7.46% of total irrigated area. In Manikpur circle, due to unsuitable geohydrological conditions, well irrigation shares negligible percentage. 74.44% of total area irrigated by well is confined in Karwi circle. Very low percentage of canal irrigation and suitable geohydrological conditions are the main factors responsible for high percentage of well irrigation. With the installation of tube-wells and development of canals, irrigation by wells is loosing its importance gradually. Traditional methods of water lifting from wells are prevailing in the region. Persian wheels (Rahat) are commonly used.

Tube-wells - Tubewells, installed during seventies, irrigate only 3.23% of total irrigated area. There are 141 tubewells (1981), most of which are electrically powered. Due to increasing electrical power facilities, the area irrigated by tubewells has increased by 42.95% during 1975-80. Karwi circle shares the highest percentage (60.02), of area irrigated by tubewells and is followed by Parsaunja (28.69) and Sardhua (11.20) circles.

Other Sources - Other important sources of irrigation in the study area are tanks, bunds, pumping sets etc. Southern

Table 5.9 : Lift Canals - Salient Features

Sl. No.	Name of the Canal	Origin Point	Length of Distribution system (Kms)		Discharge (Cusecs)	Cultural Commond Area (acres)	Proposed Irrigated Area (acres)	
			Main Cnal	Total			Kharif	Rabi
1.	Bankat Pump Canal	Near Bankat Village Right Bank of Paisuni	2.1	7.7	10	1922	577	1345
2.	Sonepur Pump Canal	Near Sonepur Village Right Bank of Paisuni	2.0	4.0	5	800	200	600
3.	Rajapur Pump Canal	Near Rajapur Right Bank of Yamuna	0.725	31.03	50	9000	6300	6000
4.	Ora Pump Canal	Near Ora village Right Bank of Baghain	-	21.6	35	7486	2246	5240
5.	Chillimal Pump Canal	Near Chillimal village Right Bank of Yamuna	22.2	52.0	120	22085	8570	10650

Source : Unpublished Record, Office of Assistant Engineer III, Karwi Sub-Division, Karwi (Banda).

upland provides suitable natural sites for construction of tanks and bunds. The network of the channels is the natural source of water. The crystalline rocky surface does not permit to percolate accumulated water. In addition to tanks and bunds, used as reservoirs for canals, the State irrigation department has constructed a number of tanks and bunds for irrigational purpose. These tanks and bunds with reservoirs capacity of 315.58 m.c.ft. cover an area of 5210 acres as cultural command area. They irrigate 4379 acres under both rabi and kharif crops.

Besides, a number of tanks and ponds, which are not properly managed, have been used for irrigation. Pumping sets are utilized to lift water from tanks, ponds and rivers. Irrigation by other sources are generally in practice in Pahari and Manikpur circles.

Extension Services

In an agriculturally dominant region, a progressive rural structure needs an adequate provision of extension services as they provide sound infrastructural base for enhancement of the regional economy. These services include veterinary facilities, seed and fertilizer distribution, pesticides and insecticides distribution and agricultural implements distribution. Most of these services are managed by government agencies.

Veterinary facilities - Livestock care and health are closely associated with health and nutrition in rural community. Veterinary facilities are meant for take care of livestock health and also to improve their breed. The existing veterinary facilities of the above area may be classified into four categories i.e. (i) Veterinary hospitals (ii) Stockman centres/ 'D' class dispensaries, (iii) Artificial insemination centres and (iv) Goat/Sheep breeding and wool extension centres. The network of veterinary centres exhibits pattern of unplanned location in the study area (Fig. 5.6A & Table 5.10).

(i) Veterinary hospitals - Veterinary hospital providesfull surgical and medical treatment. There are 7 veterinary hospitals located at Pahari, Sheorampur, Bhaunri, Raipura, Markundi, Chitrakoot Dham (Karwi) and Manikpur. No settlements below 500 population possess veterinary hospital facilities. Markundi is the smallest settlement having veterinary hospital.

(ii) 'D' Class dispensaries/stockman centres - These are lower order veterinary facilities extending first aid to ill animals. There is only one 'D' class dispensary located at Sitapur, Bardwara, Nandi, Parsaunja, Barahmuafi and Bahilpurwa are the stockman centres of the region. Bahilpurwa is the smallest settlement assigned as stockman centre.

(iii) Artificial insemination centres - Chitrakoot Dham

TAHSIL KARWI

FACILITIES

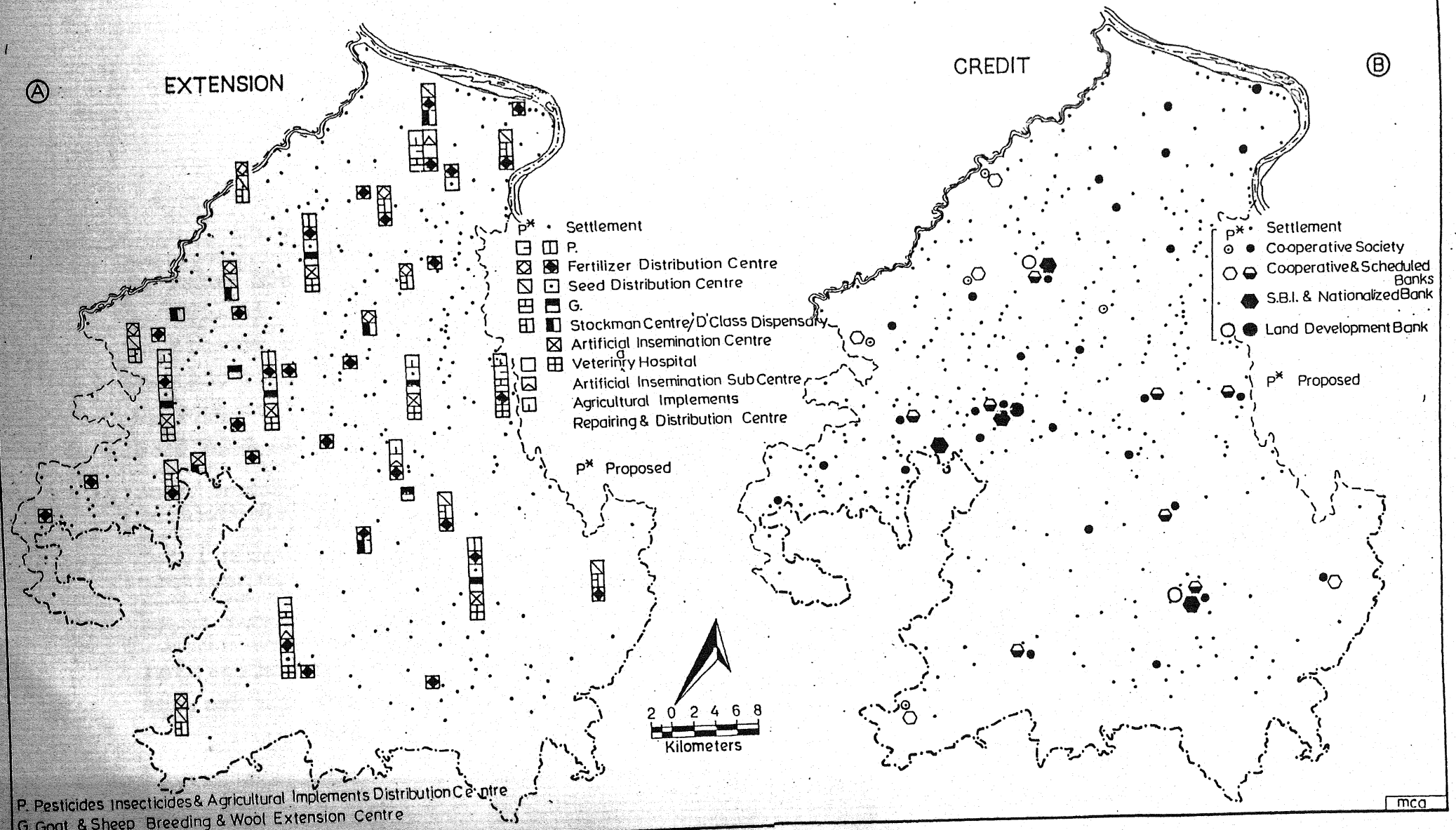


FIG.NO. 5·6

Table 5.10 : Extension Services in Karwi Tahsil (1981)

Settlement size	Number of Settlements	Number of settlements having						
		Veterinary Hospital	'D' Class Dispensary/ Stockman Centre	Artificial Insemination Centre	Goat/ Sheep Breeding and Wool Extension Centre	Pesticides Insecticides and Agricultural Implements Distribution Centre	Fertilizer Distribution Centre	Seed Distribution Centre
A. Below 200	57	-	1	-	-	-	2 (2)	-
B. 200-499	86	-	-	-	-	-	1 (1)	-
C. 500-999	116	1	-	-	1	-	6 (6)	1
D. 1000-1999	70	1	3	2	1	-	9 (12)	2
E. 2000-4999	31	2	2	1	2	1	10 (12)	1
F. 5000 & above	1	1	-	1	1	-	1 (2)	1
Total Rural Settlements	361	5	6	4	5	1	29 (35)	5
Total Urban Settlements	2	2	-	2	2	2	2 (16)	2
Grand Total	363	7	6	6	7	3	31 (41)	7

Note - Figures in parenthesis denote number of services.

Sources - 1. Office of the District Livestock Officer, Banda.

2. Office of the District Agriculture Office, Banda.

(Karwi) and Manikpur are the centres engaged in insemination and collection and distribution of semen to the AI Sub centres. Bhaunri, Sitapur, Sheorampur and Pahari are A.I Sub-centres of the region. No settlement of population below 1000 persons enjoys this facility.

(iv) Goat/Sheep breeding and wool extension centres - These centres provide goat and sheep breeding facilities with the help of improved breeders. Chitrakoot Dham (Karwi), Manikpur, Sheorampur and Pahari are goat breeding centres while Semardaha, Bhaunri and Barwara are the centres of sheep breeding and wool extension.

Pesticides, insecticides and agricultural implements distribution centres - These facilities are concentrated at block headquarters. The distribution of pesticides and insecticides is done by 'Plant Protection Units' located at block headquarters. In addition to supply of pesticides and insecticides, these units advise to the farmers for checking the decay of crops. The block headquarters supply minor agricultural implements to the farmers. Major concentration of agricultural implements occurs at Chitrakoot Dham (Karwi) where implements repairing facilities are also available.

Fertilizer and seed distribution centres - Generally, the distribution of fertilizers to the farmers is made through co-operative societies. There are six fertilizer depots

under private sector. In all, there are 31 fertilizer distribution centres. Kaloopur is the smallest village having fertilizer distribution facility. Concentration of the facilities occurs in the settlements having population above 2000 persons.

Seed distribution is performed by the seed store managed under co-operative societies. Pahari, Manikpur, Chitrakoot Dham (Karwi), Sheorampur, Bhaunri, Markundi and Mahuagaon are the seed distribution centres of the area. Besides, a number of shops located in Chitrakoot Dham (Karwi), under private management, deal with marketing of seeds specially of vegetables and fruits.

CREDIT PURSUITS

Credit pursuits have a special significance is economic supporting of agricultural activities. Farmers seeking financial help through the above agencies meet their demand of agricultural inputs, promotion of minor irrigational means, development of land etc. Fig. 5.6B presents the spatial distribution of credit facilities.

Banks

The banks provide loans and advances to different agencies like cultivators, agricultural societies, labourers, industrial establishments, local businessmen and small retail traders and thus play a catalytic role in the economiclife

of a region. Under the 'Lead Bank (Allahabad Bank) Survey' scheme 1971, a credit plan has been formulated to undertake the development of agriculture and small industries and community betterment.

In the study area, branches of State Bank of India are functioning in Karwi and Chitrakoot. Each block headquarter is facilitated with branches of Allahabad bank and District Co-operative bank. Besides, Tulsi Gramin Bank, established under twenty point programmes is extending loaning facilities to weaker section of the society. To the total assets of the bank 50%, 35% and 15% are contributed by Central Government, lead bank (Allahabad Bank) and State Government respectively. There are 6 branches of gramin bank located at Chitrakoot Dham (Karwi), Sheorampur, Bhaunri, Raipura, Markundi and Saraiyan. No settlement, having population below 500 persons, possesses banking facility (Table 5.11).

Scoieties

Co-operative societies provide financial aids for fertilizers, agricultural implements, seeds and other agricultural investment to those share holder farmers who hold landed property. There are 35 co-operative societies located at 29 settlements. During 1980-81, these societies distributed Rs. 5.85, 3.39 and 1.52 lakh as short term, mid-term and long term loans. The settlement size distribution of

co-operative societies shows a trend of concentration in the settlements of population above 2000 persons (Table 5.11).

Table 5.11 : Credit Facilities in Karwi Tahsil (1981)

Settlement size	Number of Settlements	Number of Settlements having S.B.I. & Nationalized Banks	Co-operative & Scheduled Banks	Co-operative Societies
A. Below 200	57	-	-	2 (2)
B. 200-499	86	-	-	1 (1)
C. 500-999	116	-	1	4 (4)
D. 1000-1999	70	-	1	9 (11)
E. 200-4999	31	1	3	10 (11)
F. 5000 & above	1	-	1	1 (1)
Total Rural Settlements	361	1	6	27 (30)
Total for Urban Settlements	2	2 (4)	2 (4)	2 (5)
Grand Total	363	3 (5)	8 (10)	29 (35)

Note - Figures in parenthesis denote number of facilities.

Source - 1. Development Manager, Allahabad Banks, Area Office, Banda.

2. Office of the Assistant Registrar, Co-operative Societies, Banda.

The study reveals that existing pattern of infrastructural

pursuits contributing to present regional development is uneven and unplanned and invite a proper attention for maintaining the balance in future through optimal spatial organisation and functional co-ordination.

...

REFERENCES

1. Singh R.N. and A. Kumar (1982) : 'Classical Theories of Spatial Organisation : Scope and Limitations', National Geographer, Vol. XVII No.2, p. 90.

2. Arora, R.C. (1979) : Integrated Rural Development, New Delhi, p. 261.

3. Kayastha, S.L. and Singh, R.B. (1981) : 'A Micro Level Case Study from India'. Indian Journal of Regional Science, Vol. XIII, No. 1, p.29.

4. Ibid, p.33.

5. Srivastava R.C. et al. (1984) : 'Strategies for Drinking Water Supply in Rural Settlements: A Case Study of Patha Area of Bundelkhand'. Uttar Bharat Bhoogol Patrika, Vol.20, No.1, p.45.

6. Regional Development Plan for Banda-Hamirpur Region (1974-1999) Town and Country Planning Department, U.P. Lucknow, p.262.

7. Singh H.P. (1979) : Resource Appraisal and Planning in India, New Delhi, p.115.

8. Ibid, p. 123-124.

9. Brown, P.A. (1959) : 'The Local Accessibility of Nottingham', The East Midland Geographer, No.11, p.41, Cited in Singh, S. and Chauhan V.S. (1984), Regionalisation for Rural Development and Planning, Meerut, p. 142.

10. Regional Development Plan, op.cit., p.325.

11. Tripathi, V.B. and Chand, R. (1983) : 'Micro Level' Locational Planning for Market facilities: A case study of Bulandshahr District', The Geographer, Vol. XXX, No.2, p.63.

..

CHAPTER - VI

IDENTIFICATION OF PLANNING UNITS AND APPROACHES FOR INTEGRATED AREA DEVELOPMENT

Identification of Planning Units

The planning units consist of clusters of settlements of varying sizes. Delineation of these units requires proper investigation in different sectors of economy. Theoretically, the planning units should be delineated before identification of actual locations for investment within each sector. The central place theory and its related concepts provide a methodology by which the process is reversed[1]. Accordingly, (i) the identification of central places, (ii) demarcation of zone of influence and (iii) delineation of planning units is performed in a successive way. Since the central places has already been identified in Chapter IV, here an attempt has been made to demarcate the zone of influence of the existing centres with the help of primary and secondary data of trade and service linkages and thereby planning units.

DEMARCATION OF INFLUENCE ZONE

By influence zone or hinterland region, we mean the surrounding or such complementary area where population depends on a central settlement for goods and services offered by it. The attraction between the central place and its dependents is governed by the nature of functions and services. Central places, as agents of economic and social advancement emphasize the importance of tributary areas in the process of development.

Various methods have been used to demarcate the zone of influence. Among them Reilly's[2] law of 'Retail gravitation, converse's[3] concept of breaking point and Yeats[4] model for 'Hinterland determination' are noteworthy. Godlund[5] and Green[6] have made the base the data of bus services while Christaller's attempt is based on centrality and hierarchy of respective centres. Bracey[7] used new rural components of centrality. Besides, approaches made by Wanmali and Sen deserve special mention for their valuable contribution in the context of service centres.

In the present study, for the demarcation of zone of influence both qualitative and quantitative methods have been used.

Qualitative Method

It is based on space preference analysis made in the Chapter IV of the present study. The people's choice for the centres i.e. space preference represents the clarity of identification of zone of influence of the centres. The method has been employed in two successive stages. First, all the centres at each level of functional hierarchy have been marked on map. Secondly, considering the spatial linkages, the zones of influence of each centre of second, third and fourth level, have been demarcated. The number of villages and population served by each centre at different level of functional hierarchy is listed in table 6.1 & 6.2.

Table 6.1 : Number of villages and Population Served by the Fourth Order Central Places

S.No.	Central Place	No.of villages served	Population served (1981)
1.	Chitrakoot Dham (Karwi)	31	51330
2.	Manikpur	37	29723
3.	Pahari	25	22101
4.	Sheorampur	24	18934
5.	Bhaunri	20	17525
6.	Sardhua	11	15786
7.	Bardwara	11	13831
8.	Raipura	17	13700
9.	Parsaunja	15	12581
10.	Rukma Khurd	9	12126
11.	Khohi	15	12105
12.	Bhadedu	13	11783
13.	Ainchwara	12	11769
14.	Bhaisaundha	10	11177
15.	Ora	12	10718
16.	Lohda	7	9014
17.	Chakaundh	12	8033
18.	Nandi	14	7919
19.	Saraiyan	4	7513
20.	Markundi	8	8307
21.	Bachharan	14	6956
22.	Ghuretanpur	13	6261
23.	Unchadih	4	6059
24.	Itwa Dudaila	5	4942
25.	Sitapur	6	4641
	Total	349	333854
	Outside the Region		
1.	Rajapur	14	9135
	Total	14	9135
	Total Tahsil	363	342989

Table 6.2 : Number of Villages and Population Served by Third order Central Places

Sl.No.	Central Place	No.of village served	Population served (1981)
1.	Chitrakoot Dham Karwi	68	80391
2.	Manikpur	61	57473
3.	Pahari	63	60284
4.	Sheorampur	56	43492
5.	Sardhua	20	28161
6.	Bhaunri	27	20141
7.	Ainchwara	13	13161
8.	Raipura	17	13265
	Total	325	316368
	Outside the Region		
1.	Rajapur	38	26621
	Total	363	342989

Quantitative Method

In order to demarcate the hinterland, various scholars have used 'Reilly's Law of retail gravitation. According to Reilly, the trade area boundary between two towns 'A' and 'B' in Kilometers from 'B', may be determined as follows taking population or number of central functions as an index of size _

$$\frac{\text{Kilometers between 'A' and 'B'}}{1 + \sqrt{\text{Size of 'A'/Size of 'B'}}}$$

In the present study, the above equation has been slightly modified[8] as under -

$$LS = \frac{D}{1+\sqrt{AC/BC}}$$

Where D = Distance between the centres

AC = Centrality score of centre 'A'

BC = Centrality score of centre 'B'

LS = Limit of service region of place 'A' from 'B'

Using the above formula, the influence zone of each centre at each, functional level has been demarcated. Superimposing this model on the village map of the study area, it is concluded that :-

(i) the straight lines of model do not exhibit proper coincidence with real boundaries of the settlements.

(ii) physical barriers thoughvitally affect human interactions bear no significance.

(iii) actual human behavioural pattern, especially regarding space preference, does not seem to be identical with geometrical shape, emerged through model.

On the basis of above demerits, it is not proper to rely on the aforesaid theoretical method, though the same may be taken as a guide for empirical method.

Delineation of Planning Units

To delineate the planning units, the maps of zones of influence of the central places having different hierarchic orders, obtained by both methods, are superimposed. In case of any discrepancy, the space preference data have been preferred. The final boundary of planning units has been decided after adjustment with administrative boundaries. Thus 25 micro level and 8 meso level units have been decided (Fig.6.1).

The micro level planning units consist of central villages and their hinterland. The market villages and locality nodes, being more central in character have larger hinterland. Thus, three types of units at different scales indicate the nature of investment that can be made inthem. As dependant villages are already linked with central villages, the planning of new investment in these centres will strengthen already existing spatial linkages. Thus, for the planning of social facilities and agricultural infra - structure, the lowest order planning unit, called cluster[9], would be used. In the study area, wherein, the basic infrastructure is absent, the cluster will normally provide the most important base for planning. For the industrial planning the attention would be paid on regional town, locality nodes and market villages and their hinterlands. Thus, the present planning approach would be based on planning units of different orders, selected on the basis of sector of planning and magnitude of investment.

TAHSIL KARWI

PLANNING UNITS

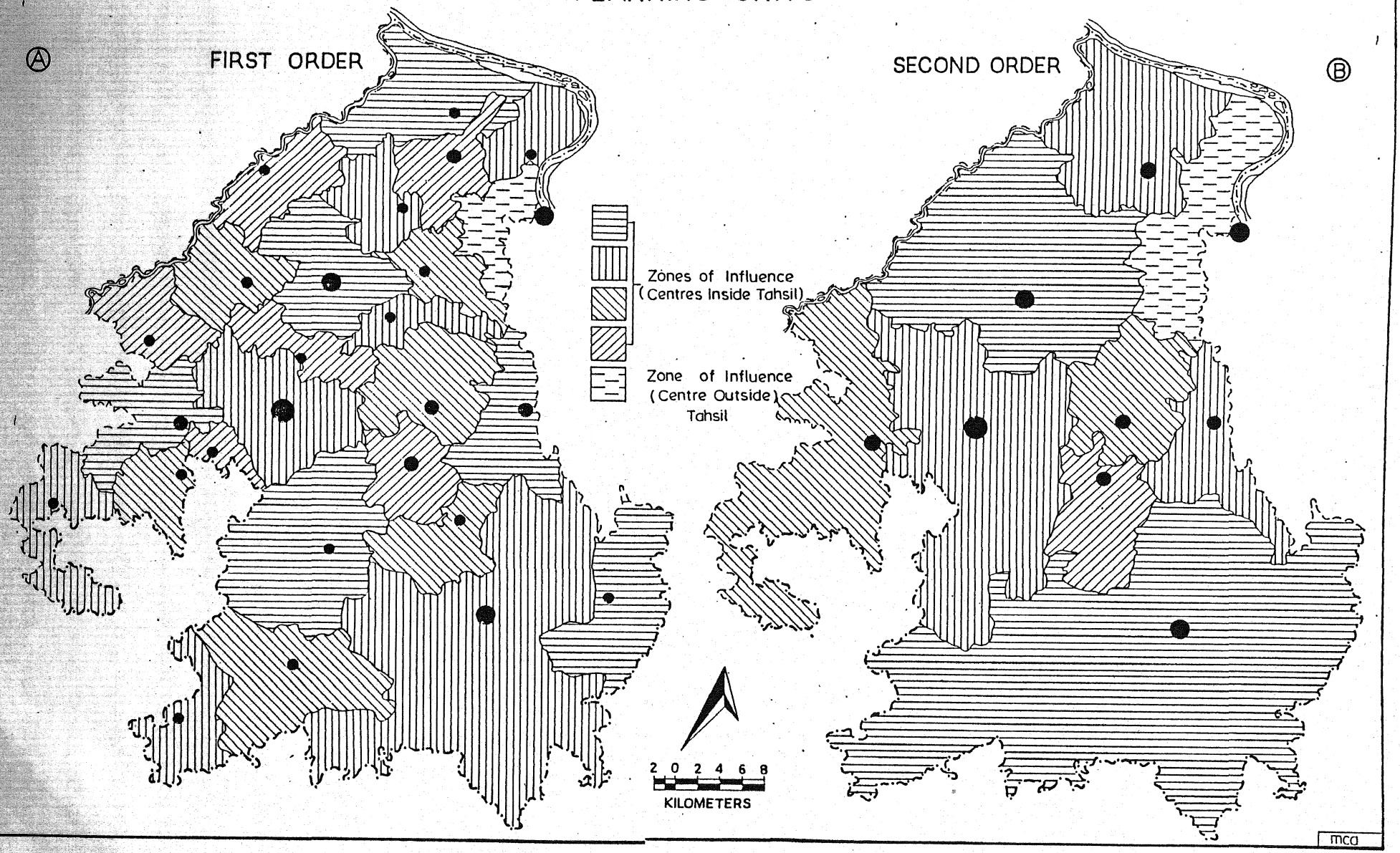


FIG.NO. 6.1

Planning Approaches

Development planning approaches the economic and social transformation of habitat on one hand and economic growth on the other. In broad sense, it is a conscious efforts by the society to generate economic and social change and to create an institutional framework which will incorporate change as a continuing process[10]. Up to 'Fourth Five Year Plan', some spatial approach was made but it had been tackled from sectoral angles. Consequently, all the drawbacks of sectoral planning introduced at regional level. The ignorance of social and environmental dimensions of development has remained one of the basic factors responsible for imabalanced development. There was an urgent need for bringing the whole development into correct spatial focus. Presently, it has been realised that integrated area development is essential for carrying the benefits of development to the more backward section of the community and also strengthening the rural economy.

Integrated area development planning, basically aims at providing a better standard of living to the inhabitants of a region. The main objective of the area development plan is to provide a concrete and well organised programme for sustained and integrated development of an area through active participation and collaboration between official, non-official and voluntary agencies and people. Keeping in the view, the analysis and findings of the foregoing Chapters, the integrated area development plan of the tahsil incorporate the following aspects :-

(i) Planning for the development of land, water, biotic, mineral and human resources in the view of their optimum utilization and conservation.

(ii) Planning for the development of agriculture in respect of landuse, irrigation, cropping pattern, input provision etc.

(iii) Planning for development in industrial sector with due emphasis onthe agro-based small scale cottage and village industries.

(iv) Planning for development of an effective socio-economic infra-structure.

(v) Planning for spatial and functional integration to enforce proper distribution of services and functions.

(vi) Development of motivational pattern for effective implementation of planning policies.

ESTIMATION OF POPULATION

Any long term planning approach may not be realistic without estimation of future population growth. An attempt has, therefore, been made to project the population of each micro level plannings unit. The growth rate of decade 1971-81 has been taken as a base to project the population for 1991 and 2001 (Table 6.3).

PLANNING FOR RESOURCE DEVELOPMENT

In order to boost up the regional economy, judicious

Table 6.3 : Projected Population

Sl.No.	Planning Unit	Projected Population 1991	2001
1.	Chitrakoot Dham Karwi	73999	106357
2.	Manikpur	41619	56389
3.	Bhaunri	26547	37994
4.	Bardwara	25204	37494
5.	Sheorampur	24352	29926
6.	Pahari	23047	28579
7.	Bhaisaundha	17136	25779
8.	Sardhua	16408	18951
9.	Ora	15514	21105
10.	Rukma Khurd	15311	19332
11.	Raipura	14950	17339
12.	Khohi	14694	18681
13.	Parsaunja	14238	17848
14.	Bhadedu	12776	14625
15.	Ainchwara	12407	14207
16.	Lohda	11755	15331
17.	Chakaundh	10652	13899
18.	Markundi	9920	13469
19.	Saraiyan	9433	11694
20.	Bachharan	8498	10384
21.	Nandi	8313	9291
22.	Ghuretanpur	8111	10538
23.	Unchadih	7604	9545
24.	Sitapur	5268	6447
25.	Itwa Dudaila	5967	7208
	Total	433723	568412
	Outside the Region		
1.	Rajapur	11735	14052
	Total	11735	14052
	Total Tahsil	445458	582464

and planned utilization of resources attract our foremost attention. Regional plan for the economic development of an area, must be considered the development of resources as an important factor. Development of resources should be planned in such a way as to make maximum use of it. However, conflicts arise in the process of developing resources. Some land is suitable for both agriculture and forestry. Similarly water may be used for irrigation, power generation, industrial and domestic purposes. Often these demands are inconsistent, therefore, a system of resource allocation is necessary to distribute available resources among competiting uses. This can only be done by separate planning of individual resources. For the purpose, optimum utilization and conservation of available resources in the tahsil have been considered significantly.

Land Resource

Land resource development in the region faces the follwowing problems -

(i) Soil erosion and (ii) Soil fertility.

Soil erosion is the severe problem of the study area. Improper and indiscriminate exploitation of natural resources (specially forest and mineral resources) enhanced the process of soil erosion. The land along natural water courses such as the Yamuna, the Baghain, the Paisuni, the Ohan etc., are badly eroded. In the ravines and undulating land which

is devoid of forest cover, seepage run off ratio is very low. It is proposed to arrest the total rainfall by making trenches, gully plugging, check dam etc. Although soil conservation schemes are well practised in the area (Table 1.4) yet larger eroded land is lacking the conservation measures. It is proposed to establish one more soil conservation unit at Manikpur and to educate the people regarding losses and damages due to soil erosion and the facilities provided by government for soil reclamation.

Fertility of the soils can be determined on the basis of presence of basic nutritive elements i.e. nitrogen, phosphorus and potash in the soils. All the soils of the study area are deficient in nitrogen. The deficiency is much acute in the rankar and paruwa soils of upland region. The paruwa soil is badly short of phosphorus. Generally, nitrogen and phosphorus deficiency is well marked in upland region and ravine tract of the northern plain. To improve the fertility of the soils optimum quantity of fertilizers is needed. The cultivators are advised to get tested their soils from 'District Soil Testing Laboratory'. Considering the side effect of heavy fertilization on soil, it is advised to adopt the techniques of cattle dung and green manuring to maintain the natural balance of organic component. A mobile testing laboratory with its headquarter at Karwi is proposed to be maintained.

Landuse Planning - Landuse planning is an inevitable technique for suggesting the rational and optimum utilization of land resource. Considering the changing pattern of landuse and regional demands and needs, the following proposals have been made for optimum land utilization for 1991 and 2001 (Table 6.4).

Table 6.4 : Proposed Landuse

(Area in acre)

Landuse	Existing 80-81		Proposed			
			1990-91		2000-01	
	Area	%	Area	%	Area	%
1. Net Area Sown	254594	48.57	314784	60.06	368297	70.27
2. Land Put to Non-Agricultural uses	25210	4.81	31185	5.95	36688	7.00
3. Barren and uncultarable Land	59298	11.31	26520	5.06	7914	1.51
4. Forest Area	85016	16.23	96700	18.45	105033	20.04
5. Other culturable Land	42066	8.02	28617	5.46	5346	1.02
6. Fallow Land	57933	11.06	26311	5.02	839	0.16

Based on - 1. Regional Plan for Banda-Hamirpur Region (1974-99) Town and Country Planning Department, U.P.

2. Personal Observations in Field.

(i) The land put to non agricultural uses will be increased (7.00%) due to extension of proposed roads, canals, settlements for the demand of increasing population etc. This increase in area will be partially compen-

sated by decrease in barren and unculturable land.

(ii) The area under forests will be increased upto 105033 (20.04%) acres against 85016 acres (16.23%) at present. The land requirement for extension of forests would be compensated by barren and unculturable land.

(iii) The other culturable land will be decreased (1.02%) by making land under cultivation and crops and groves.

(iv) It is proposed to decrease the area under fallow land (0.16%) and considerable increase in net area sown (70.27%).

(v) Due to improvement in land utilization pattern there will be an increase of 113703 acres area under cultivation.

Water Resource

Increasing frequency of drought in the area, has attracted the attention of planning agencies for development of water resource; surface as well as under ground water.

The Baghain, the Yamuna and the Paisuni are the perennial water sources. Various seasonal torrents also form the major part of surface water. The surface water has been harnessed by constructing dams and reserviors along these streams. A number of canals has been constructed for supplying water for irrigation. To make a comprehensive utilization of water resource a number of canals has been proposed to be constructed.

The detailed study for availability of underground

water reflects that except Manikpur block which is totally a negative area, has vast potentiality for irrigation water[11]. Providing adequate and dependable ground water for irrigation, intensive geohydrological mapping of the area is proposed.

Fisheries Development - The optimum utilization of surface water can be made by the development of fisheries. The study area has a good scope for development of fish culture. To provide gainful employment to a large number of people or as a side business with agriculture the ponds and tanks of the area may be utilized. The study of existing fisheries activity in the region shows that fisheries development efforts were mainly confined in large and medium water reservoirs. But vast water reservoirs of villages remained largely neglected. Recently, the government has also fixed priority for development of fishculture in small water areas. The Gram Sabhas and private parties are encouraged to take up fish-culture in village tanks and ponds. The department of fisheries, besides supplying fingerlings of fast growing species, extends all technical help to fish culturists.

The study of existing water resource of the region shows that there is vast potential water resource for the development of fisheries in future. According to survey conducted by fisheries department there is 704.73 hectare potential land of village tanks and ponds for development of fish culture in the study area. Manikpur circle presents

ample scope for fisheries development in reservoirs, dams and bunds. Table 6.5 presents proposed area of dams and reservoirs to be brought under fishculture. Following steps are proposed for the development of pisciculture in the area :-

Table 6.5 : Area of Existing and Proposed Reservoirs for Development of Pisciculture

Existing Reservoirs	Area	Proposed Reservoirs	Area
Jhalmal Bandhi	161	Chittu Purwa Dam	315
Belha Dam	128	Garhchapa Dam	315
Kurmi Purwa Dam	218	Maro Nala Dam	647
Chheriha Khurd Dam	64	Kusmi Bandhi	420
Chandra Mara Dam	841	Turkaha Pahar Dam	226
Bheda Dam	259		
Jamunihai Dam	161		
Total	1832	Total	1923

(i) Long term lease of gram samaj reservoirs are proposed to enable the farmers to undertake the programme.

(ii) Fisheries development in reservoirs and rivers should be undertaken by public agencies.

(iii) Watering facility in tanks and ponds should be provided in adverse season by irrigation department.

(iv) As pisciculture is more profitable than agriculture

on per unit of area, new ponds may be constructed where physical conditions and other infra-structure is suitable.

(v) Provisions for financial assistance to fish-farmers should be made through co-operative societies.

(vi) Co-operative societies should be established for providing technical guidance and infra-structural facilities for development of pisciculture.

Forest Resource

For the improvement of the environmental quality and ecological balance, the planning of forest resource seeks special significance. Forest resource of the area faces the problems of over grazing, soil erosion, illegal and irregular cutting and lack of proper and planned management. Planning of forest resource consists of two phases :-

(i) Conservation and (ii) afforestation.

Conservation of Forest Resource - Conservation of forests implies both the optimum development of forest products as well as their perennial supply[12]. The history of deforestation in the area begins from the last decade of 19th century with construction of railways. The gradual destruction of forest for some of the products such as Khair logs, timber, firewood and bamboo is still constinued causing a considerable deterioration in the forest resource of the area. The mercyless cutting of trees by both authorised and unauthorised persons

is a serious set-back in the development of forests. Over grazing, encroachment and free movements of 'Kols' for the collection of the forests products have also deteriorated forests to some extent. For the development of forests as a resource and its conservation, some proposals may be outlined as under :-

(i) Over grazing, unrestricted falling of trees, unauthorised use of forest products, free use of wood of various categories should be banned by making some amendments in existing forest constitution.

(ii) Silviculture programme should be promoted by planting quick-growing species.

(iii) An intensive road construction programme must be taken to connect inaccessible forest areas with the objective of proper care and best utilization of forest resource.

(iv) With a general perception of future need it is suggested to bring at least 2% land under forests for regular supply of domestic fuel and timber as well as soil protection and moisture control.

(v) Inferior forest crops of low economic value should be replaced by more valuable species of industrial and commercial importance.

(vi) Better and modern techniques of logging and timber extraction should be implemented.

Afforestation - In addition to protection of existing forest resources, attempts should be made to bring additional land under forest cover. Afforestation and social forestry are the measures to minimise degradation of forests and shortage of fuel wood in the area. Social forestry aims the best utilization of area not available for cultivation and cultivable waste land and generates employment opportunity for rural community. Farm forestry, a new approach in the development of forest resource also possesses the limited scope in the region. With due consideration of wide scope of afforestation and social forestry, following recommendations, for the development of forest resource in the area, are enlisted-

(i) In forest blocks where forests have cut down, plantation of valuable species should be made.

(ii) Major part of barren and cultivable wasteland should be brought under social forestry scheme.

(iii) Roadside plantation should be initiated. All existing and under construction roads should be considered for plantation.

(iv) A Forest Survey and Research Unit, affiliated Forest Research Institute, Dehradun, should be established at Chitrakoot Dham (Karwi).

(v) People's participation should be ensured by effective implementation of social forestry and farm forestry programmes.

Livestock Resource

There are wide scope for the development of livestock resource in the area but it requires a careful appraisal and sound planning with respect to existing problems and requirements. Livestock of the region are facing a number of problems of feeding, breeding and health. Livestock resource development programme consists of following steps:-

(i) Cattle and dairying development.

(ii) Development of ovines.

(iii) Development of poultry and pig husbandry.

(iv) Improvement in feed and fodder.

(v) Improvement in animal health and breeding facilities.

Cattle and Dairying Development - Cattle and dairying development programme provides body building foods and drdught power for agriculture as well as creates subsidiary occupation opportunities to small and marginal farmers and landless labourers. The development of dairying in the area shoots following aims :-

(i) To supply good quality milk in urban and rural areas and thus to promote the health of masses.

(ii) To organise a ready market for milk in rural areas thereby providing opportunity to the weaker section to augment their income by adopting dairying as subsidiary occupation.

The dairying economy of the villages suffers from serious drawbacks. The majority of cattle are seriously underfed. Total number of milchstock of the region is 93222 heads but per head milk production is very low. Fodder crops in the area occupies nominal share of land. Cultivators do not take good care of their disease prone animals which invariably affects the quality and quantity of milk production. About 50% villagers do not have separate shades for their animals. For the development of dairying following steps are proposed to be undertaken :-

(i) Loaning facilities to small and marginal farmers and landless labourers should be extended and be made curruption free.

(ii) Milk production on per head milch stock should be increased by improving feeding and breeding conditions. It is proposed to increase the production upto 2 to 3 Kgs. in 'desi' cows and 3 to 5 Kgs. in buffaloes. Godhan Vikas Nigam is working for cross breeding work in 'desi' cows to increase milk production 10 to 15 Kgs/day[13].

(iii) Market facility for milk and milk products should be assured by organising more co-operative societies. All the third order centres are proposed as milk collection centres.

Development of Ovines - The areas where irrigational facilities are not available the programme of sheep and goat development would very profitably be taken upto augment the income of

marginal farmers and landless labourers. The sheep and goat development programme can successfully implemented in areas where trees like babool and Khair are naturally grown. The following steps are proposed for ovine development in the area-

(i) To establish sheep and goat units through marginal farmers and landless labourers by providing loans at 50% subsidy. The average size of sheep and goat units are 20 to 10 heads respectively.

(ii) To establish sheep and goat breeding centres at all the third order central places.

(iii) To provide modern techniques of breeding, feeding and disease control. For the purpose training facilities should be extended to breeders.

Development of Poultry and Pig Husbandry - To fillup the nutritional demand and provide the supplementary source of income, the poultry development programme should be undertaken. The existing infra-structure contributing to poultry farming is not sound enough. Following steps are proposed for the developmentoof poultry farming in the region:-

(i) To improve the laying capacity of birds from 50-60 eggs to 100 eggs per bird by improving breeding and feeding conditions.

(ii) To establish chick raising units at second order centres i.e. Chitrakoot Dham (Karwi), Manikpur and Pahari, for the distribution of chiken to surrounding areas.

(iii) To develop the integrated system for collection of poultry products. For the purpose, it is proposed to maintain a vehicle with headquarter at Karwi to collect poultry products from third order centres known as collection centres. The system will provide efficient marketing facilities to the poultry farmers.

(iv) To develop poultry development centres at central villages for supervising the poultry farming within their hinterland.

(v) To provide guidance, training and loaning facilities to the poultry farmers.

(vi) To make available ready food on subsidised rate.

Pig husbandry also possesses wide scope in the area. It can be developed by improving breeding and feeding facilities. Piggery development centres providing all technical knowledge and guidance are proposed at Chitrakoot Dham (Karwi), Pahari and Manikpur.

Improvement in Feed and Fodder - Ill feeding is more common problem in the development of livestock resource in the area. Most of the farmers fail to manage sufficient green and dry fodder. The pasture and graging grounds are gradually decreasing due to extension of cultivated area. Assuming the ever increasing demand of fodder at least one percent of total land should essentially be spared for pasture and graging grounds. The farmers should also be

convinced to grow green fodder.

In the study area, the main source of livestock feed is crop residue of cultivated cereals such as paddy, jowar and wheat of very poor nutritive value as it is rarely supplimented with oil cake and flour. In 'Patha' area, miracle fodder tree known as Ku-babul is grown for green fodder to animals and subsidiary occupations to the landless labourers, a project has been implemented. Under the scheme, 5000 landless 'Kol' families were selected and one acre land had been provided to each family for growing Ku-babul for green fodder and vegetables. At present juncture of success of this project, it is suggested to provide one acre land to all scheduled castes families for growing green fodder. The ravine tract of the Yamuna, the Baghain and the Paisuni should be included under the project.

Improvement in Animal Health and Breeding Facilities - Rural health and nutrition is closely linked with animal care and improvement of animal health. The existing veterinary facilities are quite inadequate to serve an immense wealth of livestock resource. The inadequacy and unsuitable location of veterinary service centres of the area attract our attention towards ill health of livestock. In order to improve the livestock healthand cure them from various prevalent diseases new locations of veterinary facilities have been proposed. (For detail vide Planning for socio-economic infra-structure).

For the qualitative improvement of livestock resource, an intensive artificial insemination is required. For providing artificial insemination facility efficiently and effectively new locations have been proposed.

Mineral Resource

The prospects of mineral production in the study area is limited due to inadequacy of transport facilities, underdeveloped mining operations and lack of proper investigation. Following measures are proposed to develop mineral resource of the area -

(i) Rajauhan-Deori mines should be connected by metalled road to its loading station Manikpur.

(ii) Mining operations and techniques should be improved to ensure maximum possible exploitation.

(iii) Economic exploitation of minerals such as dolomite, Ochre and China clay should be initiated by providing transport and other infra-structural facilities.

(iv) The quarring of building stones and stones for making grits should be planned in such a way that ecological balance may not be disturbed.

(v) For the local consumption of mineral resource, medium and small scale industrial units such as aluminium, cement, paint and varnish should be established at Manikpur and Karwi.

(vi) A systematic geological survey for investigation of mineral resource should be organised to ensure their availability and reserves.

Human Resource

On the basis of the analysis of various aspects of population, the problem of human resource development may be pointed out as follows:-

(i) Increasing pressure of population on existing resources particularly on land resource, (ii) low quality of population, (iii) low sex ratio, (iv) low percentage of working force (v) less female participation in activities, (vi) low level of literacy, (vii) slow urbanization, (viii) slow and steady migration (ix) low standard of living (x) poor public health.

Since the population of the region is growing tremendously (annual growth rate 2.685%), it generates the problems of fooding, housing and health. To reduce the population growth, sufficient awakening towards family welfare programmes in co-ordination with public health programmes is needed. Increasing pressure of population on agricultural resources should be transferred to other job providing sectors. The population of the area is technologically inferior. The problem may be solved by imparting technical education through different technological agencies.

Low sex ratio (879), which creates social disorder should be made balance by creating job opportunity for female population and motivating the people for changing their conservative attitude and behaviour with females. Very low literacy rate (20.84%) proves a drawback for development strategy. The eradication of illiteracy among the poor villagers through the adequate provisions of formal and informal education is essential. Diffusion of literacy and vocational training will definitely enhance the quality of human resource and provide more job opportunities for non-workers.

Man Power Planning - The human resource of the area is most under utilized which has led to failure of area to attain the optimum rate of economic growth. In the study area, 60.66% of total population is parasite on working population. Besides, 3.72% population belongs to marginal workers which gets employment less than six months during the year. A large share of working population (23.94%) consists of landless persons, working as agricultural labourers. During agricultural off season, they are forced into idleness and utter poverty. For the improvement of living conditions of these workers, regulation of working hours, fixation of minimum wages, improvement in working conditions and provisions of social security may be some of the useful steps. It is necessary to provide adequate employment to large number of women by developing household and cottage industries.

Educated youngmen share considerable percentage of non working population. Therefore, the current need is to provide employment opportunities in the rural areas. The national scheme of 'Training' Rural Youth for Self Employment (TRYSEM) should be properly launched by establishing centres at Chitrakoot Dham (Karwi), Manikpur and Pahari, extending job training facilities to both educated and semi educated unemployed rural youth. The Food for work programme should remain in action for construction of proposed roads, community buildings and plantation. For providing employment opportunities in rural areas, the credit and other infra-structural facilities should be increased in each sector of development. Although number of schemes for providing financial assistance and guidance for establishing own job in the field of agriculture, pisciculture, poultry farming and industrial development has been implemented yet due to its faulty system-approach, the real benefits are not reaching upto desired persons.

Role of Rural Women and Youth in Development

Most activities of human societies move around the women, so the rural women must be awakened to their responsibility both individually and collectively and share in the development of the community[14]. One Mahila Mandal has been proposed at Nyay Panchayat level by organizing rural women to promote different activities such as improvement in economic status, family welfare, health, sanitation etc. These Mahila Mandals should be helped and guided by gram

Sevikas, midwives etc.

Like 'Mahila Mandal' the 'Nav Yuvak Mangal Dal' may also be organized at village level. These organizations should be guided and assisted by government agencies to perform activities like village sanitation, construction of roads, controlling of soil erosion, plantation etc. on Shramdan basis. Besides, farmer's organizations deserve special significance for propagation of development activities and facilities provided by government agencies.

PLANNING FOR AGRICULTURAL DEVELOPMENT

In broad sense, agricultural development denotes over all increase in the use of inputs and maximum returns from the land. There is a vast scope for increase in agricultural production by intensive input provisions such as irrigation, fertilizers, improved seeds, plant protection, land reclamation and mechanization.

Identification of Potential Agricultural Land

It is estimated that due to high growth rate, the population of the area will be 445458 persons in 1991 and 582464 in 2001. For fulfilling the food requirement of such huge population the area under cultivation should be increased. In 1981 there was 312527 acres area under cultivation which includes net area sown and fallow land. It is proposed to reduce fallow land upto 0.16% and other

culturable land upto 1.02% in 2000-01 (Table 6.4). The decrease in fallow and other culturable land results the increase in net area sown. Thus, net area sown is proposed to be 70.27% in 2000-01.

The existing area under double cropping is only 13.81% of net area sown. Low percentage of double cropped area is due to lack of irrigational facilities. The increasing demand of food grains and increased irrigational facilities with other preharvest input will certainly enhance the multiple cropping. It is anticipated to bring 25.0% and 40.0% of net area sown under double cropping till 1990-91 and 2000-01 respectively.*

Irrigation

For the intensive and scientific cultivation, irrigation is considered as most crucial single factor without which all the inputs fail to obtain desired result. In the study area, only 14.20% of net area sown is irrigated. Hence, there is an urgent need to extend area under irrigation by tapping surface and underground water resources. The following strategy should be adopted for improving the existing irrigation system in the region.

(i) To give more stress on development of canals and water courses.

---

* Based on Regional Plan for Banda-Hamirpur Region.

(ii) To provide adequate drainage in the irrigation command area.

(iii) To improve the engineering structure for better regulation and augmentation of water supply to the field where deficiency is being experienced.

(iv) To provide scientific application of water to crops and adoption of cropping patterns would confer the maximum economic benefits.

(v) To provide over all land development for maximum water control and moisture preservation in dry area. Considering the future needs and demands, for the proper development of agriculture, it is proposed to increase irrigated area by 25% and 40% of net area sown by 1991 and 2001 respectively. Table 6.6 presents the proposed irrigated area by different means during the plan periods.

Proposed Irrigational Schemes- The study area needs more irrigational work of both medium and minor nature so that the major percentage of additional acreage of cultivated land may also be brought under irrigation. There are number of perennial and non-perennial streams, on which dams and tanks may be constructed. In the Pahari block and the northern part of Chitrakoot block, the geohydrological conditions for tube-well irrigation are suitable. Underground water reserves are available at the depth of 50 meters in Pahari block. The depth of water varies 2.5 to 2.8 meters in aquifer[15]. Being composed of sandstones, the patha area, has hardly any possibility for getting sub-

Table 6.6 : Proposed Irrigated Area

(Area in acres)

Sl. No.	Means	Existed 1980-81		Proposed 1990-91		Proposed 2000-01	
		Area	%	Area	%	Area	%
1	Canals	30779	84.61	41500	65.25	50000	49.11
2	Tubewells	1178	3.23	9200	14.46	24000	23.57
3	Wells	2716	7.46	5500	8.65	11500	11.30
4	Other sources	1704	4.70	7400	11.64	16300	16.02
	Total Irrigated Area	36377	100.00	63600	100.00	101800	100.00
	Percentage of NAS	14.29	-	25.00	-	40.00	-

Based on - 1. Regional Plan for Banda-Hamirpur Region.

2. Personal Observation in the field.

soil water for irrigation. Keeping in view the hydrological conditions, terrain and geology of the area, some proposals for bringing more area under irrigation, have been made (Fig. 5.5B).

Canals - Bardaha dam is under construction at a distance of 1.5 Kms. west of Jaro Muafi village on a perennial river Bardaha. Under the project three canals i.e. Bardaha main canal, Jaro minor, and Parasin minor are proposed. The project when completed will irrigate 3039 and 781 acres of rabi and Kharif crops area respectively[16].

Three pump canals i.e. Panauti pump canal, Lamiyari pump canal and Patna pump canal have been proposed for the successful irrigation of the area. The sites selected for canal construction are right bank of the river Paisuni near village Panauti, right bank of the Balmiki near village Lamiyari and left bank of the Balmiki near village Tera Buzurg. The total discharge of all three canals is proposed to 35 cusecs. The proposed length of distribution system is 24.5 Kms. The system when completed will be able to irrigate 3600 acres of rabi and 2180 acres of Kharif crops in Pahari block.

Dams and Bunds - A small dam with storage capacity of 65 mcft. is proposed to be constructed across the Karibarar, a seasonal stream near Panhai railway station. It is proposed to irrigate 954 acres area under rabi crops in Unchadih and Kota Kandela villages by the dam. Besides, Chittapurwa dam, Garhchapa Kusmi Bund and Turkaha Pahar bund are also proposed. These dams and bunds when completed will provide irrigation to an area of 3152 acres.

The water of the Surbhanga nala in monsoon season can be stored in the north of Kusmi village by constructing a dam on it and thus irrigational facilities can be provided to cultivated area of Itwa Dudaila, Bambhia, Kusmi and a part of Mangawan villages. In the north of 'Patha' Kirhai bund on Bhainsaha nala has already been constructed but it has not been harnessed for irrigation. If the bund is repaired it may definitely be utilized for providing

irrigation to Garhchapa and Hanuwan villages. A dam across the Gularha nala near Ranipur village can be constructed for providing the irrigational facilities to Ranipur and Giduraha villages.

Wells and Tubewells - The irrigation by wells and tube-wells is more profitable where canal irrigation is not possible due to unsuitable terrain. Construction of masonry wells in 'Patha' area is required to be supported by deepening of wells by blasting. Actually digging of wells includes a very high cost, labour and skill and generally contains 3 to 4 feet standing water which is too scanty. The wells, oftenly become dry during summers. Deepening of wells by blasting unit even for 20 feet, providessatisfactory storage and can be used for irrigation purposes. In the areas of acute shortage of even drinking water, the cost of construction of blast wells due to rocky area is too high. The estimated cost of 16' diameter blast well is Rs.0.25 lac, which should be provided by government as subsidy. The construction of masonry wells by blasting technique will not only solve the problem of drinking water but also provide perennial source of water for irrigation. Considering the fact that one masonry well fitted with 'Charas' or 'rahat' irrigates near about 3 acres land, It is proposed to establish 1000 and 3000 masonry wells during first and second phasesof plan period respectively.

The detailed study for availability of underground

water reflects that the region except 'Patha' area has good potentialities for the exploitation of underground water to be utilized for tubewell irrigation. On an average one tubewell irrigates 15 acres area. It is proposed to install 500 and 1500 tubewells upto 1991 and 2001 respectively.

Installation of pumping sets - To increase the efficiency of masonry wells and tap the natural water sources, the use of pumping sets needs to be popularised. There are 2163 pumping sets in the area. As one pumping set provides irrigation to 8 acres cultivated land, there will be an addition requirement of 3000 pumping sets by 2001 A.D.

Cropping Pattern

The following provisions have been made for the improvement of cropping pattern in the study area :-

(i) The cultivation of food crops and cash crops should be intensified by applying more inputs.

(ii) A new and suitable cropping pattern must be evolved so that in the major part of the year, the fields remain engaged rather than fallow land.

(iii) The crop rotation system which is rarely practised needs to be implemented in order to maintain the fertility of the soil.

(iv) Farmers should be trained with regard to the selection of most profitable crop. Thus, crop specialization resulting into optimum yield would become possible.

(v) In the 'Patha' area the emphasis should be given for cultivation of food crops as the area suffers with the shortage of foods while cash crops cultivation should be intensified in the rest part of the Tahsil.

(vi) In the proximity of settlements, the fields should be allocated to the crops like vegetables and fruits.

The study area is mainly food grain producing, occupying 97.41% area under food crops. Cash crops such as oil seeds, sugarcane etc. share only 1.75% of total cropped area. For strengthening the economic base of rural community i t is proposed to increase the area under cash crops upto 8% in 1990-91 and 12% in 2000-01. For providing vitamin rich foods to vegetarian rural community, proposals have been made to increase area under vegetables by 4 and 8% in the first and second steps during plan period respectively.

Input Provisions

Adequate and timely supply of modern agricultural inputs such as improved seeds, fertilizers, pesticides-insecticides, advanced agricultural implements etc. and sufficient knowledge about their uses largely affect the agricultural production. The proposals for future requirements and appropriate location of distribution centres of such inputs are pre-requisite for the development of agriculture in the region.

In order to attain a certain level of production under given conditions of irrigation, there is a need of good

management and assured supply of different fertilizers. Per hectare consumption of fertilizers in the study area is 12 kilogrammes which is much lower than the state average (49.40). The prior estimation of the required amount of fertilizers would help in making arrangement at proper time. The future requirement of fertilizers has been estimated taking into account of state consumption average[17] (Table 6.7). The use of fertilizers depends on physical and biological characteristics of the soil, which vary at short distance. It is, therefore, suggested that the farmers should have the knowledge of these characteristics through soil test. As the frequent use of fertilizers increases pH index of soil, more attention should be paid on cattle dung and green manuring. Total production of nitrogen, phosphorus, potash by cattle refuse has been estimated earlier. The farmers should be motivated to use cow dung as manure instead of as fuel. The green manure such as 'dhaincha', red gram and sunhump should be sown to fulfil the nutritional requirement of the soil.

Other modern inputs such as hybrid and high yield variety seeds, improved implements, energy etc. which at present are beyond the reach of common farmers, should be made available adequately and efficiently. It has been observed that the farmers having a small piece of land do not have the capacity to manage draught force and implements. It is, therefore, suggested to provide them

tractors, threshers etc. at reasonable rent through the public agencies managed at centres of third order. The repairing facilities of such sophisticated implements should also be arranged at above centres where private equipment holders may avail these facilities.

Table 6.7 : Distribution and Requirement of Fertilizers

(In Metric Tons)

Fertilizers	Existing Distribution	Requirement		
		1980-81	1990-91	2000-01
Nitrogen(N)	840	4327	5680	6483
Phosphate(P)	228	1055	1385	1581
Potash (K)	32	410	539	615
Total	1100	5792	7604	8679

A sound network of extension services is required for the proper development in agriculture. Locational planning of these services will be discussed under the head 'planning for Socio-economic infra-structure'.

PLANNING FOR INDUSTRIAL DEVELOPMENT

Economy of the study area has a great reliance on the agriculture which shall continue to play a major role in the economic development of the tahsil but nevertheless other sectors of economy can not be ignored by achieving the aim of integrated area development. Agricultural

economy can not be sustained without an increase in industrial activities. Industrialization has the potential of relieving the heavy population pressure on land by providing alternative employment opportunities to the surplus man power in agriculture. All the objectives of technical transformation of the area, therefore, need integration of rural industrialization with agriculture. For achieving a satisfactory economic level it is required that the programme of industrial development should be fit into agricultural rhythm in such a way so that both can find their appropriate place in an efficient system of production without leading to social disintegration.

Strategy for Industrial Development

Industrial strategy for backward region like study area should be based on medium and small scale industries. The expansion of the existing small scale industrial units is necessary to break the vicious circle of inactivity, stagnation and poverty. Nucleus centres of small scale industries should be created all over the region. The establishment of such centres would emerge various calss of skilled artisans, technicians and entrepreneurs Who would help to accelerate the growth o f large industries.

It must be pointed out that the programmes of industrial development suggested here will only be possible if the natural resources are utilized in best suitable way. The development of forestry, mining and agriculture is, therefore, necessary for bringing the tempo of rural industrialization.

The establishment of the village and cottage industries forms an important sector of rural development for generating additional income and employment opportunities. This will not only facilitate the integration of agriculture and industry but also contribute a great deal to solve the endemic problem of rural employment. Considering the availability of raw material and local needs and demands, the pattern of industrial development has been decided as follows:-

1. Industries directly contributing to agricultural development.
2. Agro-based industries procuring their raw material from agricultural produce.
3. Forest based industries.
4. Mineral based industries.
5. Other consumer and ancillary industries.

Proposals for Industrial Development

For the balanced industrial development of the area under study, following norms have been proposed :-

(i) Development of medium and small scale industries should be limited at first and second order centres.
(ii) Central places of third order should be devoted to small scale and household industries.
(iii) All the central villages should be developed as the

centres of household and cottage industries.

With due consideration of aforesaid norms the proposals for establishment of industrial units at different order central places have been made (Appendix-E). The general suggestions pertaining to industrial development in the tahsil are as follows-

1. Supply of working capital.
2. Provision of regular supply of raw material.
3. Supply of skilled labour.
4. Entrepreneurial development.
5. Training programme.
6. Establishment of industrial estate.

The factors of entrepreneurial development and training programmes are basic and most important aspects of industrial growth in a backward region like tahsil Karwi. For the planned industrial development at regional town Karwi, an industrial estate is proposed to be established.

PLANNING FOR SOCIO-ECONOMIC INFRA-STRUCTURE

The Socio-economic infra-structural combines all

the aspects of social, economic and spatial planning. The recent integrated rural development programmes in India are essentially area development programmes with emphasis on socio-economic development. It gives priority for meeting the basic minimum needs of the people[18]. The programme focuses on (i) distance minimization of social services (ii) adoption of national minimum needs programme and (iii) people's active participation through qualitative social structural changes.

Integrated area development planning can not be succeeded without removing the areal disparities in the levels of socio-economic as well as socio-cultural development. In this context the remarkable fact is that, it is not enough to build more schools to improve literacy or to establish more health institutions to make healthy rural community. The proposals pertaining to the socio-economic facilities have been made to fulfil the spatial distributional gaps but the real benefits of these proposals will not reach to the weaker section of the society unless and untill they are not mobilised. It is, therefore, suggested that the

social workers and private and government agencies should come forward to mobilise and help the weaker sections by providing details of the programmes and related benefits.

Here the proposals for education, health, communication, market, electricity, extension services and credit facilities have been put forward for balanced socio-economic infrastructure.

Education

Education, formal or informal needs to be integrated with other developmental inputs in order to enhance the pace of socio-economic development of a region. Our educational planning has been expenditure oriented in the view of quantitative expansion. The due importance has not been given to the spatial planning of the institutions of formal education[19].. Since education is a long term activity, educational planning should have a long term perspective. Hence, there is a need to evolve an alternative educational planning strategy in order to take education to the children of the disadvantaged groups and in a manner convenient to them and with a curriculum content relevant to their needs. It should also be relevant to local culture and environment.

The study area on one hand is poor with respect to number of educational institutions and on the other, it presents a imbalanced picture of spatial distribution of

these institutions. At present, the defects of education system prevailing in the tahsil are very low literacy, emphasis on formal education, lack of female education and absence of adequate facilities for technical and vocational education. In 1981, the literate persons accounted for only 20.84%. The study area also records very low female literacy (6.84%). The more effective attempts should, therefore, be made to promote education among females. The main factor which hinders literacy is the location of schools and colleges.

Strategy for Development of Educational Facilities

Strategy for development of educational facilities forms a base for evolving standards for future development of different types off schools in the rurality of the region. The national minimum need programme suggests that the primary school should be within 1.5 Kms. for every school age, a middle school (Junior high school) 5 Kms. and a high school 8 Kms. Though the minimum need set by Planning Commission has been followed, the threshold population and spatial gaps have also been taken into consideration for suggesting the proper location of educational institutions. The proposed locations of educational institutions are shown in Fig.5.2A.

Primary School - For the proper locations of primary schools the norms given are as follows :-

(i) All settlements will have primary school within 1.5 Kms. distance.

(ii) The settlements situated beyond 1.5 Kms. distance and having population of at least 500 persons will have a primary school.

On the basis of above norms 9 settlements have been identified as suitable points for locating primary schools.

Junior High School - Likewise primary schools, the following norms have been followed, suggesting the proper locations of junior high schools.

(i) All the settlements will avail junior high schooling facility within 5 Kms. distance.

(ii) All the settlements of population 1857 persons and above will have junior high school.

On the basis of these two norms with due consideration of time and cost distance 11 settlements have been selected for the proposed location of junior high schools.

High School and Intermediate college - For proposing the location of high schools and intermediate colleges in addition to norms proposed by Planning Commission, general central place plan has also been considered. Besides, time and cost distances have been preferred over the physical distance. The proposed norms are :-

(i) All the settlements having a population of 2750 persons (MPT) and above will have high school.

(ii) All the settlements identified as central place of second and third order will have intermediate college.

(iii) There should be separate education institutions for girls above junior high school standard.

Following the aforesaid norms, Pahari, Sardhua and Sheorampur have been proposed for locating intermediate colleges. The centresidentified as proposed location of high school are Ora, Bhaisaundha, Ghuretanpur, Rukma Khurd, Markundi and Unchadih.

In addition to above proposed educational facilities, a degree college and an Industrial Training Institute (ITI) have also been proposed at Chitrakoot Dham (Karwi) for acomplishment of local demand of degree and technical-vocational education. It is also suggested to cimbine primary school with junior high school and junior high school with high school wherever such combination is feasible so as to economise on space and cost of building.

Informal Education - There is no scope for adults in formal education system due to age restriction. Majority of children of backward, scheduled castes and scheduled tribes remains illiterate as they are unable to get admission to these schools and remain unable to contimue their study due to stringency and social problems. There is a wide scope for introducing various types of informal education for specific target population. (i) School drop-out aged 10-14 boys and

and girls can be separately taught literacy using concepts and words linked to their present or future role in life (ii) young mothers, 15-25 years can be given informal demonstration education by learning to do things related to better nutrition for chiltren, better hygiene, safe drinking water and family planning (iii) young farmers, 15-35, may be taught functional literacy using information about new high yielding strains of recommended crops, fertilizer needs, farm accounting new cropping cycles, farm mechanization etc. and (iv) oldermen 36-50 or older women 26-50, can be taught in separate classes either functional literacy or learning to do things useful for their occupation or they can be taught new skill from which they can economically benefit immediately[20]. Informal education scheme for dropout children is under implementation in Manikpur block of the area.

Health

Planning for health should aim to provide integrated health care, both functionally and spatially. Reviewing the health status of the area, it appears that people mostly suffer from fever, malaria, dysentery, diarrhoea, tuberculosis, cholera and respiratory diseases. Unsafe and polluted drinking water in villages too, causes infectious diseases. Immunization programme, though has succeeded in controlling small pox, cholera, typhoid etc. its compulsory operation is needed for rural areas. Continuously growing population

has increased pressure on medical care system. The provision of rural health care facilities is not sound enough from operation view point. The inadequacy of health facilities is reflected in the large distance travelled by rural people for availing these facilities.

Strategy for Development of Health Facilities

Health facilities like preventive medicine, family welfare, nutrition and provision for referring serious cases to higher level centres have been taken under minimum need programme. The programme during Sixth Plan outlined the following objectives[21] :-

(i) Establishment of one community health centre for a population of one lakh or one C.D. block by 2000 A.D.

(ii) One PHC for 30000 population in plains and 20000 in tribal and hilly areas by 2000 A.D.

(iii) Establishment of one sub centre for a population of 5000 in plains and 3000 in tribal and hilly areas by 2000 A.D.

(iv) One Community Health Volunteer for a population of 1000 or a village by 1990 A.D.

Considering the existing standards of health care facilities and suggested norms at national level, the following proposals have been made to develop the five tier Integrated Health Care System:-

(i) The existing hospital of regional town Chitrakoot Dham (Karwi) should be upgraded as district level hospital. Units of paediatrics, radiology, anaesthesiology, intensive care and blood bank should be established. Number of beds should be increased upto 100 each for males and females.

(ii) Existing PHCs with high degree of family planning facilities should be upgraded as Community Health Centre (CHC) with 25 beds each for males and females.

(iii) As the villagers find it difficult to travel longer distance for medical treatment PHC should be established at all the market towns with five beds for each males and females.

(iv) The central villages should be designated as Health Sub Centre (HSC) having dignostic treatment, family planning, maternity and child welfare services. These centres should be provided with two beds.

(v) Each village should have one Community Health Volunteer (CHV) at each 1000 population and trained Daia at each 500 population.

Fig. 5.28 shows the proposed locations of health facilities.

Drinking Water Facility -Reliable and safe drinking water for good health of rural masses is one of the most important variables contributing to integrated area

development. The problem of supplying drinking water to our rural folk is a multy-facet problem that needs a serious attention of our engineers, administrators and beneficiaries alike[22]. The launching of a development programme for rural water supply needs a careful planning approach.

Anticipated Demand of Drinking Water - Drinking water supply scheme of 'Patha' area has been designed to supply drinking water at the tate of 45 litres per capita per day for rural areas and 90 litres per capita per day for urban areas, but the scheme remained unsuccessful to fulfil its objective especially in rural areas. Rural water supply programme has been included in the minimum need based programme of Fifth Plan. Demand of water supply has been worked out for existing and projected population of the area. The standard adopted is 75 litres per day per capita for rural areas and 100 litres per day per capita for urban areas. Table 6.9 presents the existing and projected requirement of water supply in the area.

Proposals for Drinking water Supply - Drinking water supply scheme of 'Patha' area has to be integrated into overall regional development to function as a catalyst for socio-economic development. Undoubtedly, if the scheme becomes successful with co-ordination of government machinery and beneficiaries, this backward area will neither be hard

Table 6.9 : Requirement of Drinking Water

Area	Existing	Projected	
	1981	1991	2001
Rural	222.24	292.97	375.05
U rban	37.33	56.33	82.39
Total	266.57	349.30	457.44

pressed with water nor affected by water borne diseases. Following proposals have been made for successful working of the scheme:-

1. Safety, regular inspection and repair of distributional system should be maintained.
2. Quality control by reliable disinfection of source and supply must be insured.
3. Water supply must be made regular and reliable even in odd situation.
4. The water scarcity villages i.e. Tikaria, Gursarai, Mangawan, Bambhia, Itwa Dudaila, Kusmi and Kota Kandaila should also be included in the command area of water supply scheme.
5. The beneficiaries must be made conscious of ownership and promotional participation in order to reduce the wastage of treated water, to take action against miscreants and restricted use o f water in drought period.
6. Water connections should be provided to tribal and economically poor people at payable capacity.
7. As the economic condition of rural community is not suitable for commercialization of water supply, it must be regulated as the welfare of rural mass.

In 'Patha' area the villages which can not be covered under water supply scheme, installation of hand pumps should be initiated. Besides, blasting wells can be used

as source of tapping underground water. For fulfilling the additional requirement of water, underground water resources should be exploited by installation of tubewells.

Communication

POSTAL SERVICES

The extension of the postal network in rural areas has been facilitated by the liberal policy of government according to which new post offices are opened not only at such places where they are economically justified but also at the places where they serve the broader interest of rural community. The policies adopted by government for the development of postal services are :-

1. Opening of post offices (i) In all the villages with a population of 2000 persons or more where annual loss does not exceed Rs.750 per annum per post office. (ii) in the group of villages with a minimum population of 2000 p ersons within a distance of 3 kms. provided that no new post office is opened with in 4.5 Kms. from an existing post office. Unless it is self supporting or else loss on each post office does not exceed Rs.750 per annum. (iii) in the backward areas provided that the loss does not exceed Rs.1000.00 per post office per annum due to difficult terrain, sparse population and lack of literacy. (iv) in all newly developed areas and the areas which are congested and where work-load is too heavy[23].

2. Extension of delivery services to all no dak villages.
3. Increase of frequency of the rural delivery service.
4. In large town a person should not have to travel a distance more than one Km.for post office.

Keeping in view the above policies and regional demand the following norms have been adopted while proposing the postal facilities in the area.

(i) All villages should avail postal facility within 3 Kms.
(ii) All the village above population 1750 persons (MPT) should have a post office.
(iii) All the central villages should have telegraph facility too.

In all 17 post offices and 15 post and telegraph ooffices (with telephone facility) have been proposed for the efficient postal system of the area (Fig. 5.3A).

TRANSPORT

In order to have active inter-change between rural areas and market centres, to take full advantage of marketable surplus, activating free flow of essential inputs and facilitating the disposal of products, the area requires sound road network. The analysis of existing transport network reveals that area lying beyond 10 kms. from rail and road network shares 9.65% area which is completely inaccessible.

Proposed Road Network

The objective set by 'Planning Commission' for the development of roads under 'Minimum need Programme' of Sixth Plan is linking of all villages with population of 1500 persons and 50% of the total villages with a population group of 1000-1500 by 1990 A.D. A comprehensive new road network has been proposed for accelerated growth of area considering the (i) topography of the area (ii) people's demand (iii) the expected central place plan and (iv) objectives of Planning Commission. It is proposed that:-

(1) All the settlements with population of 1500 persons and above should be linked with metalled roads.

(2) All the central villages and market villages should be connected with metalled roads.

(3) Semi-dependant villages should be linked to central villages with unmetalled road and proposed to be converted into metalled road subject to availability of funds.

Considering the above norms 177 Kms metalled roads have been proposed (Fig. 5.4A). It is suggested to open forest roads for general public with co-ordination of forest department. Completion of under construction roads and proposed net work will change the socio-economic structure of rural area. For providing direct link to Allahabad pantoon bridge on the Yamuna at Rajapur should

be converted into permanent bridge. Similarly, permanent bridges on Pahari-Oran road on the Paisuni and the Baghain and on Rajapur-Sardhua-Kamasin road on the Baghain are also proposed. The ferry service at Chillimalghat should be converted into pantoon bridge for connecting the area to Fatehpur district.

Power and Rural Electrification

Power is the basic requirement for the development of both agricultural and non-agricultural sectors of the economy Inadequate and irregular supply of power has discouraged the farmers from adopting minor irrigational system. The diesel and electricity are the main power resources of the area. Unfortunately both power resources are in scarce supply. The use of electric power is considered to be more advantageous due to increasing prices of petroleum products.

According to norms of Planning Commission at least 60% of the villages should be electrified during Sixth Plan. In the view of Planning Commission's objectives the following proposals have been made for rural electrification of the Karwi tahsil :-

(1) All the villages situated along perennial rivers should be get top priority in electrification programme.

(2) All the villages having population of 2000 persons or more should be electrified because near about

30% population resides in these villages.

(3) All the market villages and central villages, should be electrified.

(4) The process of electrification should be planned in such a way so that 75% villages could get electric facility by 1991 and remaining 2001 A.D.

On the basis of above norms, it is proposed to electrify 52 villages at first stage (Fig. 5.3B). Besides, electric transmission system of the area should be improved. For the improvement in the transmission system it is proposed that:-

(i) Pahari should be linked with Kamasin with 33 K.V. power line.

(ii) 11 K.V. power line, starting from Pahari should be extended to Oran.

(iii) 132 K.V. transmission line coming from Sirathu should be extended to Banda.

(iv) 33 K.V. power station should be established at Pahari.

(v) 33 K.V. power station of Manikpur should be upgraded as 66 K.V. power station.

It is also proposed to develop non traditional sources of energy such as bio-gas solar energy and wind energy. The rural people should be motivated for harnessing these energy sources through publicity and training programmes.

Markets

The success of the integrated area development programme,

lies on the balanced spatio-functional organization of marketing system. For the diversifying the human activities, facilitating the disposal of village produce and generating significant growth impulse to their surroundings, the study area must be facilitated with periodic markets. With due consideration of central place system and median population threshold (MPT), the following norms have been proposed:-

(i) All the central villages should have periodic market facility.

(ii) The central villages of population 2000 persons and above should be treated as daily retail market centres.

(iii) Cattle market should be helded at central places of population 5000 persons and above.

On the basis of above norms 9 daily retail markets, 17 periodic markets and two cattle markets have been proposed (Fig. 5.38).

Extension Services and Credit Facilities

In order to change the traditional views of the farmers and to facilitate the distribution of agricultural inputs, government machinery is active through block development programme by propagating about new agricultural innovations among the farmers. The farmers are bound to travel long distance to get fertilizers, implements, improved seeds etc., which are generally available at block headquarters. The sound planning of these services aims that these should

be available to the users within their easy reach.

The increasing number of banking, facilities in rural areas will help a lot in the economic development in terms of agriculture, industry, trade and commerce and in other tertiary activities. Similarly, the co-operative societies are playing a significant role in the agricultural development of the area. The financial problem of the area can be solved, if credit facilities could be provided in easy going process and make people conscious for use of these facilities.

In the implementation of the strategy for locating extension services and credit facilities, the MPT of each function has been considered carefully. Additionally, the central place system and the distance range of goods have also been taken into account. Fig. 5.6 shows the proposed functions at different order centres.

PLANNING FOR SPATIAL AND FUNCTIONAL INTEGRATION

The spatial integration is defined as an exercise of completing (functionally) incomplete system of settlements and attempting to combine the different parts of that system in a coherent pattern. The functions and settlements both are inter-related with one another in respect of hierarchy. The functional co-ordination of settlements can be realised through the functional hierarchy of settlements.

Thus, spatial integration indicates the locational aspects of growth and development activities in which all the settlements in space are involved, while functional integration refers to the integration of all economic and social activities. Optimum, spatial and functional integration require well-developed hierarchic pattern of settlements. A central place plan has, therefore, been prepared on the basis of 'locational 'functional gap, as discussed in Chapter IV of the study. The proposed central place plan has been organised in the following stages :-

(1) To select the subsidiary centres which requires an immediate attention.

(2) To propose the spatial organization of central places for 2001 A.D.

It is observed that central villages fulfil the basic requirements of the people of the area, therefore, these centres have been proposed for immediate attention. The proposed fourth level centres are Biharwan, Darsenda, Hariharpur, Barah Muafi and Ranipur Kalyangarh. As these centres belong to remote areas, special attention should be paid in providing facilities and services pertaining to agriculture and allied activities. In order to find out the optimum location of such subsidiary centres 'Aggregate Travel Distance' (ATD)[24] of expected settlements has been obtained.

For providing the better services to the rapid growing population and minimising the spatio functional gaps, the central place plan for 2001 A.D. has been proposed. Considering the physical characteristics and level of economy of the region, it would not be feasible to increase the orders of the centres; rather it would be better to maintain the order and add more central places with a view to minimise the spatio-functional and numberical gaps. Taking all these facts into consideration, 42 central places are proposed for 2001 A.D. with a frequency of 2, 3, 9 and 28 in the four tier system of central places. It shows an increase of 17 centres over 1981 (Fig. 4.4 B). This proposal besides taking into account, the existing pattern of central places includes their growth trend and spatial characteristics by 2001 A.D. Transport accessibility, population growth and demand of services, prospects of growth potentiality etc. is based on the concept of strengthening the central places in lower order of hierarchy.

The above framework presents a better pattern of spatial organization system to accelerate and induce development processes. The development of central villages requires junior high school, branch post office, rural health centre, request bus stop, weekly markets, primary credit societies, cottage and village industries, distribution centres of fertilisers, improved seeds and pesticides,

repairing shop for repairing agricultural implements etc. Such services cell on an average fulfil the requirements of 8 dependent villages having easy transport connections.

Motivation Pattern

It is not possible to obtain the desired goal of integrated area development without strong motivation pattern, inducing the development processes. Forstrenghening the motivation pattern, the following approaches require proper attention :-

1. Development of weaker sections.
2. Improvement in environmental qualities.
3. Action strategy.

Development of Weaker Sections

Small farmers, marginal farmers and landless labourers belong to poorest strata of the society. Landless labourers constitute the most intractable constituents of rural poverty. Integrated atea development aims to improve the living standard of these people belonging to low income group by making the process of their development by self-sustaining. In fact, the funds and facilities available for small and marginal farmers and landless labourers are utilized by some economically and politically strong persons in the name of these poor people. This is the root cause for thefailure of different development programmes such as

Small Farmers and Marginal Farmers Development Agency (SFDA and MFDA). Any development for the welfare of rural community can be succeeded only if the government machinery acts without prejudice and corruption.

The Socio-economic conditions of Kols* the endogenous tribal people of 'Patha' is very pitiable. Various development schemes implemented for the welfare of tribal people, could not made any markable change in the socio-economic status of Kol's. State Government has provided grants to develop cottage industries, agriculture, construction of houses, link roads etc. The 'Patha' is not totally tribal area as only 30 percent of the total population is shared by Kols[25]. The Integrated Tribal Development Programme will, therefore, not be suitable for the development of the area. The problems of Kols can be solved under socio-economic programmes of Integrated Area Development. The following proposals need to be implemented for the socio-economic development of Kols:-

(1) Co-operative societies should be established at each central village in 'Patha' area for providing loans on nominal interest, without any security, supply food stuffs, clothes and articles of daily use on fair price and purchasing forest products, collected by Kols on reasonable rates.

(2) The work of plucking, tendu leaves, wood cutting in which Kols are engaged as labourers should be

* Considered as Scheduled Castes in 1981 census.

undertaken by public agencies to protect them from exploitation by contractors. Recently 'Uttar Pradesh State Forest Corporation' has developed for the said purpose.

3. For the social and political awareness among Kols, the programmes of formal and in-formal education should be implemented effectively.

4. The social organizations i.e. 'Satguru Sewa Sangh' and 'Banwasi Ashram' engaged in extending facilities to improve animal husbandry and health should widen the horizon of their programme and include the tasks of children education and making adults concious to socio-economic innovations and their rights.

5. Majority of the Kols who have been provided land on 'Patha' is not in a position to get possession there on. Government authorities must take the task in their hand and watch that each and every piece of 'Patha' land is allotted to right person, physically and legally both.

6. The effective steps should be taken to make Kols practically free from bonded labour system through social awakening.

7. In order to have a cultural integration among Kols and non tribals, their traditional arts and culture should be developed.

Improvement in Environmental Qualities

The rapid growth of industries, urbanization and green revolution has resulted rapid economic growth of the country on one hand and disturbed natural equilibrium on the other. Growth of population is considered

as basic factor while assessing the sources of environmental pollution. High growth rate of population causing a heavy demand on natural resources specially soil, water and vegetation, results a serious disorder in the ecological system of the area. Defoestation, use of fertilizers, insecticides and pesticides, impurities both in surface and underground water are some of the major contributors to the environmental pollution. In order to provide clean air for breathing, pure water for drinking and uncontaminated food, the following remedial measures must be adopted for the protection and conservation of natural eco-system.

(1) Specific standards for the use of fertilizers, pesticides and insecticides should be maintained.
(2) Suitable plant species should be afforested along roads and open space amidst the settlements.
(3) People must be motivated to followthe conservation measure of soil, water, biotic and mineral resources.
(4) In the all levels of planning processes, envolvement of ecologists must be insured.

Action Strategy

Imbalances in growth of various areas and groups of people are signs of defective planning and implementation o n the part of policy makers and implementors of programmes[26]. The application of present strategy requires certain basic

changes in planning processes, policies and administration. The state approach though successfully redistribute the available economic activities yet it fails to bring maximization of social equality. To reinforce the development process in the weaker section, the traditional society of this backward area needs institutional and infra_structural changes which can sustain and facilitate economic development. The administrative and institutional reforms are necessary to provide social justice for under privileged. The application of growth foci concept to eliminate the regional imbalances depends largely on the administrative and institutional reforms which may be possible by (i) separation of decision making and implementing process except where they depend to one another and (ii) creation of voluntary organization.

Voluntary Organizations - Voluntary organisations play a catalytic role in o rganizing rural reconstruction programmes related with all the section of rural life. The government machinery particularly at lower level, has never been adequate either in quantity or quality to handle the programmes to be implem ented. The non profitable social service organizations are, therefore, required to co-operate government machinery. In the 'Patha' area 'Satguru Sewa Sangh', an important social organization is working with government machinery for the welfare of the poor community in the field of livestock development and health services.

Similarly 'Banvasi Ashram' with its centre at Manikpur is actively engaged in providing free medical aid to the weaker section. These organizations should be authorised to takeup implementation of government plan at local level. The volunteers of these organizations may be instrumental because people have full confidence with their mode of service. The international agencies like WHO, UNESCO, UNICEF etc. should be invited to take up the development project in the 'Patha' area.

Co-ordination Among Official Agencies - The implementation of government plan for development of an area requires better co-ordination among various official agencies. In the study region, the forest department has a large area which may be brought under social forestry with the help of public and social organizations. Similarly, afforestation programme on unculturable land of Gram Sabha seeks assistance from forest department. In such cases better co-ordination between both agencies will solve the problem successfully. Besides, arrangement for decentralized planning and administration is pre-requisite at different l evels of central places for better co-ordination contributing socio-economic development of the area.

Plan Implementation and Management System

The success of development plans requires efficient

management system for their implementation. The present block level organization of government machinery supported by Nyaya Panchayats, the primary planning units at grass-roots level is unable to fulfil the desires and aspirations of the rural community. These Nyaya Panchayats are not suitable planning units as they were formulated on the population criterion alone. Nyaya Panchayats should be reorganised and Nyaya Panchayat Kendras should also be reidentified[27] on the basis of central places as decided in the present study.

The Gram Sabha/Gram Panchayat which are the organizations of selected persons of the different section of the society, should be considered as village level plan implementation authority. The resource of the committee should be arranged from land revenue. For improvement in the economic conditions of the individual family, there should be strong link between the bank and family through village level committee. The effectiveness of the development depends on a successful co-ordination between different units of administrative setup.

...

REFERENCES

1. Sen, L.K., et al., (1975) : Growth Centres in Raichur: An Integrated Area Development Plan for A District in Karnataka, NICD Hyderabad, p.61.

2. Reilly, W.J. (1929) : 'Methods for the Study of Retail Relationships', Bulletin No.2944, University of Texas.

3. Converse, P.D. (1949) : 'New Law of Retail Gravitation', Journal of Marketing, Vol.XIV.

4. Yeats, M.H. (1963) : 'Hinterland Dtermination - A Distance Minimising Approach, Professional Geographer, Vol.XV, pp.7.10.

5. Godlund, S. (1956) : The Functions and Growth of Bus Traffic within the sphere of Urban Influence, Lund Studies in Geography, Series B, No. 18, pp. 12-14.

6. Green, F.H.W. (1952) : 'Bus Service as an Index of changing Urban Hinterland', I.P.R. Vol.22 pp. 345-356.

7. Bracey, H.E. (1953) : 'Town as Rural Service Centres' Transactions, Institute of British Geographers Vol. XIX, pp.95-105.

8. Tiwari, R.C. and Khan, N.U. (1984) : 'Spatial Organization of Rural Service Centres in Pratapgarh District, National Geographer, Vol.XIX No.2, p.95.

9. Sen, L.K. et al. (1975) : Op. cit. p.78.

10. Mishra, R.P. et al.: (1974) Regional Development Planning in India, New Delhi, p.391.

11. Regional Plan for Banda-Hamirpur Region (1974-1999), Town and Country Planning Department, U.P., p.115.

12. Ghosh, R.C. (1969) : 'Productive Forestry and Nature Conservation in West Bengal', Indian Forester, Vol.XCV, pp.724-730.

13. Project Report on Drought Prone Area Programme, District Banda, Vol.I (1974-75 to 1978-79), p.123.

14. Mishra,S.P. (1985) : Integrated Rural Area Development and Planning: A Geographical Study of Kerakat Tahsil,District-Jaunpur, U.P. Varanasi,p.125.

15. Regional Plan for Banda-Hamirpur Region, op.cit ,p.112.

16. Project Estimate of Bardaha Dam Project, 1976, Investigation and Planning Division Banda.

17. U.P.Agriculture in Brief (IX Edition) 1981-82, Department of Agricultural Economics and Statistics, C.S.A. University of Agriculture and Technology, Kanpur, p.12

18. Kayastha,S.L. and Singh,R.B, (1981) : 'Regional Development through Social Planning: A Micro Level Case Study from India', Indian Journal of Regional Science Vol. XIII, No.1, p.28.

19. Shrivastava,R.C. and Ali,J.(1981) : Spatial Organization of Educational Facilities:A Case Study of Banda District', Transactions, Indian Council of Geographers Vol.IX, p.36.

20. Roy,Prodipto and Patil,B.R. (1977) : Manual for Block Level Planning, New Delhi,p. 58.

21. Mishra,S.P. (1985) : Op.cit, p.141.

22. Shrivastava,R.C. et al.(1984) : "Strategies for Drinking water supply in Rural Settlements: A Case Study of Patha Area of Bundelkhand', Uttar Bharat Bhoogol Patrika, Vol.XX, No.1, p.46.

23. Regional Plan for Banda-Hamirpur Region, op.cit., p. 263.

24. Mishra,S.P. (1985) : Op.cit.,p. 103

25. Shrivastava,R.C. and Ali,J.(1981) : Unskilled Migrants: Their Socio-Economic Life and Patterns of Migration in Frontiers in Migration Analysis (Ed.)Mandal,R.B.,New Delhi, p.266.

26. Krishna Ram (1985) : 'A Recipe for Poverty Alleviation', Y ojna, Vol. 29 No.18,New Delhi, p.17.

27. Singh,Suraj Pal (1987) : 'Rural Development needs a complete Approach,' Yojna, Vol.30,No.24, New Delhi, p.16.

...

CHAPTER - VII

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The study area, one of the five tahsils of district Banda of Uttar Pradesh, lies between parallels of $24^{o}53'$ and $25^{o}32'$ N and meridians of $80^{o}41'$ and $81^{o}16'$ E. The tahsil covering an area of 2347.8 Km^2, is inhabited by 342989 persons (1981). The study region consists of 391 revenue villages, including 361 inhabited villages. The towns of Chitrakoot Dham and Manikpur Sarhat form the urban landscape. Tahsil Karwi is administratively, divided into 3 development blocks, 7 Kanoongo circles and 34 Nyaya Panchayats.

The distribution of rural settlements presents a correlation between physical personality and socio-economic conditions prevailing in the area. The northern plain has allowed more regular distribution of settlements than those of the southern rugged terrain. The population size study of villages reveals that large size villages are the common features of the southern upland and dissected ravine land of the north while small and medium size villages are dotted in the plain and agriculturally productive areas. The areal size of the villages is generally governed by topographic features. The districutional pattern of settlements in relation to area shows a trend of concentration. The distribution of rural settlements presents more regular pattern than random. The pattern of least regularity is observed in Bhaunri and Manikpur circles. The pattern of low regularity in Nandi circle, pattern of moderate

regularity in Pahari, Paraunja and Karwi circles and pattern of moderately high regularity in Sardhua circle are observed. The study area exhibits four types of rural settlements i.e. compact, semi-compact, semi-dispersed and dispersed.

During last eight decades (1901-1981) the total population of tahsil has grown 78410 to 342989 persons recording an increase of 337.43%. The decade 1901-11 showed an increase in population by 8.09%. Severe droughts and epidemics during 1911-21 resulted 1.50% decrease in the population. Since 1921, an over all increase in the population is marked. Arithmetic, density of tahsil for 1981 is 161 persons/km^2. The areas of low to very low density are situated in the southern part of the study area, while high to very high density is observed in central plain. The distributional pattern of density on K.Circle level shows that Manikpur and Karwi circles form the lower and upper limits respectively. The average physiological, nutritional, caloric and economic densities are 271 persons/km^2, 292 persons/km^2, 30 6 persons/km^2 and 332 persons/km^2 respectively. The village level analysis of decade variation (1971-81) shows that the areas of low to very low variation (below 20%) are extended over 24.93% villages representing the unfavourable physico-cultural conditions while high to very high variation comprising 26.59% villages reveals the sound conditions of population growth. A moderate change

in the socio-economic conditions of the people through various development programmes implemented by government machinery is responsible for high variation in population upto some extent. Variation in female population is slightly higher than male population. The study area is characterised by imbalanced sex ratio (879). The basic factors contributing to spatial and temporal variation in sex ratio are preponderance of male at birth, the different rate of mortality of two sexes at different age and sex selectivity migration. Besides, child marriage, lack of education especially among women and behavioural conservatism prevailing in Hindu families are the other factors of utmost significance. 15.51% villages fall in the group of low (below 800) sex ratio while high to very high (above 900) sex ratio group comprises 42.38% of villages representing better state of physico-cultural factors. The sex ratio on K. circle level ranges between 872 (lowest) in Manikpur and 898 (highest) in Nandi circle. Only 20.84% population to total population is literate. Literacy in urban areas is recorded 42.88% because of more schooling facilities in towns while only 18.15% of rural population is literate. The male and female literacy are 33.15% and 6.83% respectively which reflects the depressing state of females in the society. Highest literacy is observed in Pahari circle (20.09%) while Manikpur circle stands at the lowest rung (15.01%). In the study area, scheduled castes constitute 26.03% to total population whereas scheduled tribes share a nominal percentage. The village

level analysis of the distributional pattern of scheduled castes population results that the areas of concentration are extended over plateau area of Manikpur circle and in a few localised pockets in the region. The areas of sparse population are well marked in the fertile land and somewhere along the rivers. In 1981, 35.62% of total population was engaged in different economic activities. The demographic, economic and social factors which are associated with size and structure of population determine the proportion of workers. The marginal workers share 3.72% to total population while 60.66% population is parasite on working population. The highest proportion of main workers is observed in the plateau area of Manikpur circle (44.22%). It is obvious that the population of male workers in all the circlesof the region is higher than that of female workers. The percentage of marginal workers is highest (6.68) in Karwi which is followed by Pahari circle. (5.86). The percentage distribution of non-workers ranges between 53.28 (lowest) in Manikour to 62.78 (highest) in Bhaunri. The strong negative co-relation (Y = - 0.918) between cultivators and agricultural labourers shows that the areas of higher percentage of cultivators possess the lower percentage of agricultural labourers and vice versa. The spatial pattern of agricultural employment based on location quotient shows that 62.88% villages exhibits the relative dispersion of agricultural occupants. The industrial activities are concentrated in urban areas with

7.02% of total workers engaged in industrial activities. The maximum concentration of otherworkers is observed in Manikpur circle.

The general landuse pattern of the study area is quite different from the other parts of the district due to its lithology, terrain, soil productivity, settlement pattern, changing economy and social set-up. The total reported area of the tahsil is 524117 acres of which 59.63% is under cultivation. The study of changing pattern of land use reveals that during the period of ten years (1970-80) net area sown has remained constant. Increasing percentage of land put to non agricultural uses may be taken as good symbol o f development. Decreasing trend of barren and unculturable land and other culturable land on one hand and increasing percentage of area under forests and orchards on the other, show a positive trend but increasing trend of fallow land is certainly a alarming position. A general perusal of cropping pattern shows that the region is primarily foodgrain producing. Generally, the crops of low water requirement i.e. bajra, arhar, gram etc. dominate in the northern part while crops of high water need such as wheat outstanding characteristics of the cropping pattern in the study area is the practice of sowing two crops of different water requirement mixed together. Jowar-arhar is the first ranking crop in Sardhua, Parsaunja, Karwi and Bhaunri while gram-wheat in Pahari and Nandi circles and wheat in Manikpur circle stand in the first rank. Second ranking crops include gram in

Sardhua, gram-wheat in Parsaunja and Karwi, jowar-arhar in Pahari and Nandi, barley mixed in Bhaunri and Paddy in Manikpur circles. On the basis of the results derived using Refiullah's method, the study area can be divided into two-crop, three crop and four crop combination regions. The cropping intensity index (CI) for Karwi tahsil is 113.81. Manikpur circle records highest cropping intensity (120.55) due to the fact that the region obtains heavier rainfall than its northern counter part. The stagnant water make rooms for cultivation of paddy in Kharif and wheat in rabi. 48.34% villages form the group of low to very low cropping intensity (below 110) while high and very high intensity group (115 and above) comprises 37.34% villages. The variation in cropping intensity is mainly due to variation in irrigated area and partially due to fainfall and specialized cropping. The production of different crops in the study area is considerably low due to environmental and ecological limitations. Intensity of irrigation, physico-chemical property of the soils and socio-economic status may be assigned as the basic factors for low agricultural production. Parsaunja circle represents the areas of high productivity while Nandi, Pahari and Manikpur circles jointly form the areas of low productivity. Using composite score method, 3 levels of agricultural development have been decided. The percentage distribution of cows and bullocks varies from 48.30 in Sardhua to 58.67 in Pahari. The percentage of buffaloes is lower than cows and bullocks in the whole region

and ranges between 22.72% in Karwi to 15.72% in Manikpur. Bhaunri, Manikpur and Sardhua circles are important for goat rearing. The percentage of sheep to total livestock is higher in the northern drier part than the southern counter part. Sardhua and Manikpur circles form the areas of higher percentage of poultry.

Livestock and land/man relationship is an important aspect o f agriculture and has been established as livestock density (262 heads/Km^2), livestock man ratio (1062 heads/1000 persons), draught animal land ratio (27 draught animal/100 acres of NAS) and milch stock-man ratio (272 milch stock/1000 persons). Milk and meat are main livestock products of the region. Other livestock products are wool, skins, hides and bones. Besides, livestock helps in maintaining the fertility of the soil by producing a large quantity of manures. A number of industries based on animal products such as carpet, blanket, bone crushing, tanning etc. can be established. Although there is no specialized farm in dairying, the majority of farmers keep one or two milch stock according to their means, size of holdings and nature of farming. In the villages, poultry birds are maintained in small units without proper care about their feeding, housing, breeding and health. There is a wide scope to develop poultry farming by improving breeds, housing conditions and providing market facilities. Similarly, pig husbandry can also be developed as secondary occupation for depressed group of the society to strengthen their economic base. At present fisheries and irrigation department of the state are engaged

in the development of pisciculture in the study area. Total recorded area under pisciculture is 2397 hectare. There is an area of 704.73 hectares of 526 tanks, considered as potential area, for the development of pisciculture. The fish culture in the area is gradually being developed and there is ample scope for fishing and pisciculture in the area under study.

The most important minerals of the study area are bauxite, ochre, silica sand, clay, granite and building stone. The forests (governed by forest department) of the study area account for about 24% of total geographical area. The northern part, being agricultural plain is occasionally dotted with forest patches while the southern upland is covered with forests. The forests are comparatively open and height of trees is generally low. Main forest products of the study area are timber, fuelwood, charcol, Khair, bamboo, tendu leaves etc. Afforestation is being practised in two ways. (i) plantation in forest blocks and (ii) plantation along road side. Due to increasing demand of fuel wood and rapid depletion of forests, efforts are being made to bring the additional acreage under the scheme of social forestry and farmland forestry.

The existing industrial establishments are generally the small scale and household industries based on local raw material. There are 165 industrial units of which 76 units are registered. Besides, a number of household industries fulfilling the local demands and needs are scattered over the region. Forest based industries share highest percentage

(36.97) followed by mineral based (20.00%) and livestock based based (16.97%). Chitrakoot is the only pilgrim and tourist centre of the area. For the development of tourism as an industry to attract the foreigners, it should be linked with air route.

The utility of central place system increases in a developing country like India because a reorganization of space conductive to economic development is possible only at this level.

In the present study, four orders of central places have been identified and designed as (1) Regional town; (ii) locality node; (iii) Market centre and (iv) Central village. The concentration of central places has been observed along transport arteries. The distribution of central places is approaching towards regularity (Rn = 1.42). The existing distribution of central places does not possess required number of central places. In central part of the study area, the central places are quite closer to each other in the northern and southern part. The marked functional difference between different orders of central places may be conceived as development 'dichotomy'.

The existing educational structure comprises of its sub-functional like primary school , junior high school, high school, intermediate college and training institution forming five tier hierarchy. The study area is deprived of technical, vocational and degree education. Chitrakoot Dham (Karwi) is

only one centre having intermediate college for girls and training school for basic teachers. Various health care facilities, existing in the area, range from private medical practitioner to hospital. The distribution of health facilities among villages seems to be arbitrary and affected by local politics. The unsafe and polluted water in rurality is continuously affecting the mortality rate and damaging the health of crucial age groups. At present 117 villages and two towns are served by drinking water supply schemes. These schemes are facing a number of problems. Drinking water supply schemes are partially contributed by hand pumps, being installed in water scarcity areas. The distribution pattern of branch post offices reveals that they exists in the villages of more than 200 population. Transistors are quite common means of information and entertainment while prevalence of newspapers and televisions is almost nil. The existing transport network of tahsil Karwi, mainly consists of (i) railways and (ii) roads. The area served by railways is small but linkage relationship is significant. The study area has witnessed a radial pattern of road network. The analysis reveals that the accessibility by road is higher (68.55%) than by rail (56.66%). The net inaccessible area, lying beyond 10 kms. from transport artery is 9.65% of total area. The patches of inaccessible areas are observed along the Baghain and the Yamuna rivers and in upland forested area.

Rural electrification has brought about significant changes in the method of irrigation and cropping pattern. 72.90% of total electrified villages possess the electric connections for irrigational and industrial purposes. The distribution of electrified villages shows close correspondence with cultivated area. As the study area is deprived of weekly market facility, the role of daily markets in the business activities is of utmost significance. Chitrakoot Dham (Karwi) is the largest market centre, dealing with whole sale as well as retail business. Manikpur is the second largest centre specialized in business of forest products. The weekly cattle markets hold at Chitrakoot Dham (Karwi) and Pahari. There are 6 fair centres playing an important role in the business activities of the area. The canals and wells are the principal components of irrigation system. Canal irrigation dominates in Sardhua and Parsaunja circles while wells and tubewells possess special significance in Karwi circle. Tanks and bunds are the common features of the southern upland. The existing pattern of infrastructural pursuits is uneven and unplanned and invites a proper attention for maintaining the balanced infrastructure in future.

For the planning purposes, the study area has been divided into 25 micro level and 8 meso level planning units. The integrated area development plan of the tahsil incorporates the planning for resource development, planning for agricultural and industrial sectors, planning for development of effective socio-economic infrastructure, planning for

spatial and functional integration and development of motivational pattern. Considering the long term planning requirement, an attempt has been made to project the population of each micro level planning unit. The projected population of the study area is 445458 for 1991 and 582464 for 2001 A.D. Land resource development faces the problems of soil erosion and soil fertility. For the optimum utilization of land resource, it is proposed to increase the area under land put to non-agricultural uses and forests and to decrease in barren and unculturable land, other culturable land and fallow land. Due to improvement in land utilization pattern, there will be an increase of 113703 acres area under cultivation. Increading frequency of drought in the area invites proper attention for the development of water resource. To make a comprehensive utilization of surface water a number of canals have been proposed. There is a vast potentiality for the development of fisheries. 3755 hectare area under existing and proposed reservoirs and 704.73 hectare area of village tanks and ponds, have been proposed to be brought under fish-culture. For the forest resource development in the area, various proposals have been made regarding conservation and afforestation with due consideration of existing problems. Livestock resource development programme consists of cattle and dairying development, development of ovines, development of poultry and improvement in feed, fodder, health and breeding facilities.

For the development of mineral resource, proposals have been made for development of transport system, improvement in mining operations and techniques, maintenance of ecological balance, establishment of mineral based industries etc. Increasing pressure of population on existing resources, low sex ratio, low level of literacy, low percentage of working force, less female participation in economic activities and poor public health have been considered as the basic problems ofthe human resource development. For the improvement of living conditions of rural workers, regulation of working hours, fixation of minimum wages and improvement in working conditions may be some useful steps. It is proposed to establish household and cottage industries for providing adequate employment to rural women. The national scheme of 'Training Rural Youth for self Employment'(TRYSEM) should be properly launched by establishing centres at Chitrakoot Dham (Karwi), Manikpur and Pahari for providing job training facilities to rural youth. The credit facilities should be increased for establishing own job in the field of agriculture, pisciculture, poultry farming etc. There is a need to emphasize farmer's association, Mahila Mandal and Nav Yuvak Mangal Dal for successful implementation of village programmes.

Development of agricultural resource includes identification of potential agricultural land improvement in irrigation facilities, cropping pattern and input provisions. It is proposed that improvement in existing landuse pattern

will provide 60190 acres and 113703 acres additional land for agricultural use till 1990-91 and 2000-01 respectively. For increasing the cropping intensity, it is anticipated to bring 25% and 40% of net area sown under double cropping till 1990-91 and 2000-01 respectively by increasing irrigational facilities with other pre-harvest input. Keeping in the view, the geohydrological conditions, terrain, geology and increasing demand of water for irrigation, construction of canals, dams bunds, wells and tubewells has been proposed for different phases of plan period. For improvement in cropping pattern, proposals have been made for intensified cultivation of food crops and cash crops, adoption of crop rotation system and cultivation of vegetables and fruits. It is proposed to increase area under cash crops upto 8% in 1990-91 and 12% in 2000-01. In order to attain a certain level of production under given conditions of irrigation there i s a need o f good management and assured supply of fertilizers. The future requirement of fertilizers has been estimated 7604 and 8679 M.T. for first and second stages of plan period. Farmers should be motivated to use cow dung as manure instead of as fuels. The green manuring should also be practised. Other modern inputs such as improved seeds, implements, energy etc. should be made available adequately and efficiently. A sound network of extension services is required for proper development in agricultural sector.

The strategy for industrial development for a backward region like study area, should be based on medium and small scale industries taking their raw material from local resources. The establishment of village and cottage industries forms an important sector of rural development by generating additional income and employment opportunities. The proposals for establishment of industrial units at different order centre places have been made considering the general central place system. It is proposed an industrial estate in regional town Chitrakoot Dham (Karwi).

The proposals for education, health, communication, market, electricity, extension services and credit facilities have been put forward for balanced socio-economic infrastructure. For suggesting the proper location of educational have been put forward for balanced socio-economic infrastructure. For suggesting the proper location of educational facilities, the minimum need set by Planning Commission has been followed. Besides, threshold population and spatial gaps, have also been taken into consideration. There is a wide scope for introducing various types of informal education. Considering the existing standards of health care facilities and suggested norms at national level, five tier Integrated Health Care System consisting of hospital, community health centre, primary health centre, health sub-centre, community health volunteer and trained 'dais', has been proposed. Drinking water supply scheme of Patha area to be integrated into overall regional development

therefore, the proposals for successful working of the scheme have been made. In the villages which are not covered under water supply scheme, installation of hand pumps has been proposed. Keeping in the view the policies adopted by government for the development of postal services and medium population threshold, 17 post office and 15 post and telegraph office have been proposed for efficient postal system. A comprehensive new road network has been proposed for accelerated growth of the area. Inadequate and irregular supply of power has discouraged the farmers from adopting minor irrigational system. It is proposed to electrify all the villages till 2001 AD. The proposals for the improvement in transmission system have also been made. The rural people should be motivated for harnessing the traditional sources of energy such as bio-gas, solar energy, wind energy etc. For balanced spatio-functional organization of marketing system, 9 daily retail markets, 17 periodic markets and two cattle markets have been proposed. For the location of extension services and credit facilities, medium population threshold central place and distance range of goods have been considered.

Optimum spatial and function integration requires well developed hierarchic pattern of settlements. A central place plan has, therefore, been prepared on the basis of locational-functional gaps. In the proposed central place plan, Shiharwan, Darsenda, Hariharpur, Barah Muafi and Ranipur Kalyangarh have been selected as fourth level central places. For providing the better services to the rapid

growing population and minimising spatio-functional gaps, the central place plan for 2001 A.D. has been proposed.

Development of small and marginal farmers, landless labourers and tribal people should be given top priority in all the development programmes. The development programmes implemented in the region do not secure success due to corruption and malpractices. High growth rate of population causing a heavy demand on natural resources results a serious disorder in the ecological system. For the protection and conservation natural ecosystem, in all the levels of planning processes, envolvement of ecologists must be insured. Imbalanced growth of various areas and groups of people are signs of defective planning and implementation. The existing action strategy requires certain basic changes in planning processes, policies and administration. More emphasis should laid on role of voluntary organizations, co-ordination among official agencies and plan implementation and management system.

...

BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

BOOKS

Arora, R.C. (1979) Integrated Rural Development, S.Chand & Co. Ltd, New Delhi.

Baskin,C.W. (1966) The Central Place of Southern Germany, Prentice Hall, Englewood Cliffs, New Jersey.

Berry,B.J.L. (1967) Geography of Market Centres and Retail Distribution, Prentice Hall, Englewood Cliffs, New Jersey.

Bhat,L.S. et al. (1976) Micro Level Planning: A Case Study of Karnal Area, Haryana, India, K.B.Publications, New Delhi.

Buck,J.L. (1937) Land Utilization in China, Nanking University Press, Reproduced by Council of Economics and Cultural Affairs, Inc. New York (1956).

Clarke,J.I. (1966) Population Geography, Pergamon Press, London.

Godlund,S. (1956) The Functions and Growth of Bus Traffic within the sphere of Urban Influence, Lund Studies in Geography, Series B, No.18.

Husain, M. (1979) Agricultural Geography, Inter India Publications, Delhi.

Kabra,K.N. (1977) Planning Processes in a district, IIPA, New Delhi.

Kendrew,W.C. (1953) The Climates of the Continents, Oxford University Press,London.

Khan,W. and Ramesh, K.S. (1976) Integrated Area Development Plan for West District, Manipur, NICD, Hyderabad.

King,L.J. (1969) Statistical Analysis in Geography Prentice Hall, Englewood Cliffs, New Jersey.

Losch,A. (1941) Die raumliche Ordnung der Wirstschaft, (Translated by Woglom, W.H. and Stolperd, W.F. (1954) as, The Economics of Location, Yale University Press, New Haven.

Mahmood,A. (1977) Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.

Malhotra,C.L. and Ganguar,B.R. (1970) Soil Survey and Soil Work in Uttar Pradesh,Vol.II, Department of Agriculture, Government of Uttar Pradesh.

Mandal,R.B. and Sinha,V.N.P.(Eds.) (1980) Recent Trends and Concepts in Geography,Vol.III, Concept Publishing Co.,New Delhi.

Mandal,R.B. (1981) Frontiers in Migration Analysis, Concept Publishing Company,New Delhi.

Mandal,R.B. (1981) Planned Development of Rural Settlement, Concept Publishing Company,New Delhi.

Mayer,H.M. and Kohn,C.F.(Eds.) (1967) Readings in Urban Geography, (Indian edition), Central Book Depot, Allahabad.

Mehdirtha,R.C. (1967) Geology of India, Pakistan and Burma, Atma Ram &Sons, Delhi.

Mishra,R.P. et al. (1974) Regional Development Planning in India, Vikash Publishing House Pvt Ltd., New Delhi.

Mishra,R.P. and Sunderam,K.V. (Eds.) (1980) Multi Level Planning and Integrated Rural Development in India, Heritage Publishers,New Delhi.

Mishra,S.P. (1985) Integrated Rural Area Development and Planning: A Geographical Study of Kerakat Tahsil,District Jaunpur U.P., Ratan Publications, Varanasi.

Mundle,S.	(1977)	District Planning in India,IIPA, New Delhi.
Patel,M.L.	(1975)	Dilemma of Balanced Development in India, Progress Publishers Bhopal.
Patnaik,N. and Bose,S.	(1976)	An Integrated Tribal Development Plan for Keonjhar District Orissa, NICD, Hyderabad.
Prakasha Rao,V.L.S.	(1963)	Regional Planning,Theoretical Approach, Statistical Publishing Society, Calcutta.
Rao,M.S.V.	(1962)	Soil Conservation in India,ICAR, New Delhi.
Rao,R.V.	(1978)	Rural Industrialization in India, Concept Publishing Company,New Delhi.
Roy Chaudhary,S.P.	(1966)	Land and Soil, National Book Trust New Delhi.
Roy Chaudhary, S.P. et al.	(1969)	Soils of India, ICAR, New Delhi.
Roy Prodipto and Patil,B.R.	(1977)	Manual for Block Level Planning The Macmillan Company of India Ltd.,New Delhi.
Safi,M.(Ed.)	(1972)	Proceedings of Symposium on Land use in Developing Countries,21st International Geographical Congress, Department of Geography, Aligarh Muslim University,Aligarh.
Sagreiya,K.P.	(1967)	Forest and Forestry, National Book Trust, New Delhi.
Sen,L.K. et al.	(1971)	Planning Rural Growth Centres for Integrated Area Development: A study in Miryalguda Taluka, NICD, Hyderabad.
Sen,L.K.(Ed.)	(1972)	Readings in Micro-Level Planning and Rural Growth Centres,NICD, Hyderabad.
Sen,L.K. and Mishra,G.K.	(1974)	Regional Planning for Rural Electrification - A Case Study of Suryapet Taluka,Nalgonda district, Andhra Pradesh,NICD, Hyderabad.

Sen,L.K. et al. (1975) Growth Centres in Raichur: An Integrated Area Development Plan for A District in Karnataka, NICD, Hyderabad.

Sen,L.K. and Thaha,A.L. (1976) Regional Planning for Hill Area: A Case Study of Pauri Garhwal Distfict,NICD, Hyderabad.

Sharma,S.K. and Malhotra,S.L. (1977) Integrated Rural Development Approach - Strategyand Perspectives, Abhinav Publication, New Delhi.

Shinde,S.D. (1980) Agriculture in An Under Developed Region: A Geographical Survey Himalaya Publishing House,Bombay.

Shrivastava,R.C. (1967) Water Resource and their utilization in Saryupar Plain of U.P.,Unpublished Ph.D.Thesis, Gorakhpur University,Gorakhour.

Singh,H.P. (1979) Resource Appraisal and Planning in India: A Case Study of a Backward Region, Rajesh Publications,New Delhi.

Singh,J. (1979) Central Places and Spatial Organisation in a Backward Economy Gorakhpur Region - A Study in Integrated Regional Development, UBBP, GORAKHPUR.

Singh,R.L.(Ed.) (1971) India - A Regional Geography, NGSI, Varanasi.

Singh,R.L. et al. (Eds.) (1975) Readings in Rural Settlement Geography (Research Publication No.14), NGSI,Varanasi.

Singh,R.L. et al. (Eds.) (1976) Geographic Dimensions of Rural Settlements (ResearchPublication Series No.16), NGSI,Varanasi

Singh,S. and Chauhan,V.S. (1984) Regionalisation for Rural Developmentand Planning, Independent Publications Pvt Ltd.,Meerut.

Spate,O.H.K. and Learmonth,A.T.A. (1967) India and Pakistan-Land People and Economy,(Methuen & Company Ltd.),B.I. Publications,Delhi.

Tripathi,R.L. (1978) Natural Resources and Prospects of Industrial Development in Bundelkhand Region of U.P.2 Unpublished Ph.D. Thesis, Kanpur University, Kanpur.

Wadia,D.N. (1975) Geology of India, Tata McGraw Hill Publishing Company, New Delhi.

Wanmali,S. (1970) Regional Planning for Social Facilities - An Examination of Central Place concepts and their Application: A Case Study of Eastern Maharashtra,NICD, Hyderabad.

Journals

Annals,Association of American Geographers Vol.XXXIV (1944) Mather,E.C., 'A Linear Distance Map of Farm Population in United States'.

Annals,Association of American Geographers Vol.XLIII No.2 (1953) Trewartha,G.T.,'A Case for Population Geography!

Annals,Association of American Geographers Vol.LIX (1964) Dacey,M.F.,'Modified Poisson Probability Law for Point Pattern More Regular than Random'.

Ecology,Vol.XXXV (1954) Clark,P.J. and Evans,F.C.'Distance to Nearest Neighbour as a Measure of Relationship in Population'.

Economic Geography Vol.XLI (1965) Bhatia,S.S.'Pattern of Crop concentration and diversification in India'.

Geographical Review Vol.XXI (1931) Mark,Jefferson,'Distribution of World's City Folks'.

Geographical Review Vol.XXX (1940) Barnes,J.A. and Robinson,A.H., 'A New Method for the Representation of Dispersed Rural Population'.

Geographical Review Vol.XLIV (1954) Weaver,J.C.,'Crop Combination Regions in Middle West'.

Geographical Review of India Vol.XXXV,No.3 (1973) Pathak,C.R.,'Integrated Area Development: A Case of Rural Agricultural Development'.

Indian Forester Vol.XCV	(1969)	Ghosh,R.C.,'Productive Forestry and Nature Conservation in West Bengal'.
Indian Journal of Regional Science Vol.II,No.1	(1970)	Bose,A.N.,'Institutional Bottlenecks-The Main Barrier to the Development of Backward Areas'.
Indian Journal of Regional Science Vol.IV,No.1	(1972)	Chakrabarthy,S.C.,'Some considerations of Research Objectives for Rural Area Development'.
Indian Journal of Regional Science Vol.IV No.2	(1972)	Das B.N. and Sarkar,A.K.,'Rural Area Development-Karnal Area, A Case Study'.
Indian Journal of Regional Science Vol.XII No.2	(1980)	Sharma,R.C.,'A conceptual, Chronological and Attributive Treatment to the Approach of Integrated Area Development'.
Indian Journal of Regional Science Vol.XIII No.1	(1981)	Kayastha,S.L. and Singh,R.B., Regional Development Through Social Planning: A Micro Level Case Studyfrom India'.
Journal of Asian Studies Vol.XXIV No.1	(1969)	Skinner,C.W.,'Marketing and Social Structure in China'.
Journal of Behavioural Sciences and Community Development Vol.V No.2	(1971)	Wanmali,S.,'Ranking of Settlements: A Suggestion'.
Journal of Behavioural Sciences and Community Development Vol.VI No.1	(1972)	Prakasha Rao,V.L.S.,'Problems of Micro Level Planning'.
Journal of Marketing Vol.XIV	(1949)	Converse,P.O.,'New Law of Retail Gravitation'.
Journal of Royal Statistical Society Vol.CII	(1939)	Kendall,M.G.,'The Geographical Distribution of Crop Productivity in England'.
Journal of Town Planning Institute Vol.LIV	(1968)	Hilling,J.B.,'Mid-Wales: A Plan for the Regional Development.

Kurukshetra Vol.XXXII,No.4	(1984)	Patel,A.R.,'Rural Development: Experience is the Best Teacher'.
National Geographical Journal of India Vol.XII,No.4	(1966)	Singh,K.N.,'Spatial Pattern of Central Places in Middle Ganga Valley,India'.
National Geographer Vol.VI	(1971)	Krishna,G.,'Distribution and Density of Population in Upper Bari Doab'.
National Goegrapher Vol.XIV, No.2	(1979)	Singh,L., 'Integrated Rural Development: A Case Study of Patna District Bihar'.
National Geographer Vol.XV,No.2	(1980)	Singh,R.N. and Pathak,R.K., 'Integrated Area Development Planning: Concept and Background'.
National Geographer Vol.XVII,No.2	(1982)	Singh,R.N. and Kumar,A.,'Classical Theories of Spatial Organisation: Scope and Limitations'.
National Geographer Vol.XIX,No.2	(1984)	Tiwari,R.C. and Khan,N.U.,'Spatial Organisation of Rural Service, Centres in Pratapgarh District'.
Professional Geographer Vol.XV	(1968)	Yeat s,M.H.,'Hinterland Determination- A Distance Minimising Approach'.
Scottish Geographer Magazine Vol.LXXXV	(1966)	Thompson,I.B.,'Some Problems of Regional Planning in Predominantly Rural Environment'. The French Experience in Corsica.
The Geographer Vol.XII	(1965)	Raffullah,S.M.,'A New Approach to Functional Classification of Towns'.
The Geographer Vol.XIII	(1966)	Siddiqui,M.F.,'Physiographic Divisions of Bundelkhand'.
The Geographer Vol.XXX,No.2	(1983)	Tripathi,V.B. & Chand,R.,'Micro Level Locational Planning for Market Facilities:A Case Study of Bulandshahr District'.
The Indian Economic Journal Vol.XVI No.1	(1965)	Shashtri,M.V.R.,'Integration of National and Regional Economic Models in the United States'.

The Indian Geographical Journal Vol.XVI No.3	(1968)	Despande,C.D.,'Cities and Towns of Bombay Province'.
The National Geographical Journal of India Vol.XXXI,No.2	(1985)	Singh,K.N. et al.,'Service Centres and Development Strategy in Vindhyanchal-Baghelkhand Region- A Spatio-Functional Approach'.
Transactions, Institute of British Geographers Vol.XIV	)1048)	Green,F.H.W.,'Motor Bus Services in West England'.
Transactions, Institute of British Geographers Vol.XIX	(1953)	Bracey,H.E.,'Town as Rural Service Centres'.
Transactions, Indian Council of Geographers Vol.IX	(1981)	Shrivastava,R.C.and Ali J., 'Spatial Organisation of Educational Facilities:A Case Study of Banda District'.
Uttar Bharat Bhoogol Patrika Vol.XX,No.1	(1984)	Shrivastava,R.C. et al., 'Strategies for Drinking Water Supply in Rural Settlements: A Case Study of Patha Area of Bundelkhand'.
Yojana Vol.XXIX No.18	(1985)	Krishna,Ram, 'A Recipe for Poverty Alleviation'.
Yojna,Vol.XXX No.24	(1987)	Singh, Suraj Pal,'Rural Development needs a Complete Approach'.

REPORTS AND BULLETINS

Association of Voluntary Agencies For Rural Development New Delhi	Integrated Development Programme of Balpur Block,West Bengal.
Brockman,D.L. Darke	District Gazetteer Jalaun Vol.XXX, (1909)
Brockman,D.L. Drake	District Gazetteer Banda Vol.XXI (1920)
Bulletin No.2944 University of Texas	Reilly,W.J.,Methods for the Study of Retail Relationships (1929).

Census of India Monograph No.7 New Delhi	Burman Roy,B.K.,'Towards An Integrated Regional Frame: Economic and Socio-Cultural Dimensions o f Regionalization (1972).
Census of India Monograph No.7 New Delhi	Chandrashekhar,C.S., Balanced Regional Development and Regions (1972).
Census of India	Vindhya Pradesh Vol.XVI Part I (1951).
Department of Agriculture, New Delhi	A Manual on Conservation of Soil and Water,United States (1964).
Department of Agriculture Economics and Statistics C.S.A. University of Agriculture and Technology,Kanpur	U.P.Agriculture in Brief IXth Edition, Bulletin (1981-82).
Directorate of Geology and Mining, U.P.,	Swaroop, P. and Shrivastava,S.C. 'Progress Report on Bauxite Deposits Discovered in the Rajauhan Forest Block,Banda District,Unpublished Report (1968).
District Census Hand Book	District Banda (1971),Part Xth A & B.
Ford Foundation and Council for Social Development	Andrade,C.P. and Roy,P., Preliminary Reports on Pilot P roject for Integrated Area Development (1969).
Geological Survey of India,Lucknow	Bhatnagar,N.C. and Shah,D.L. onthe Possibilities of Ground Water Development in the Hard Rock and Adjacent Alluvial Area in Part of Banda District,U.P. Unpublished Report,(1966-67).
Geological Survey of India,Lucknow	Sinha,K.K. (Geologist), A Report on Systematic Geohydrological Studies in Part of Banda District,U.P. and Satna District, M.P. (1970-71), Unpublished Report.

Indian Geographical Studies & Research Bulletin No.2	Mahto,K. Pattern of Population Growth in Bihar (1974).
National Council of Applied & Economic Research,India	Market Towns and Spatial Planning (1965).
Planning Commission New Delhi	Draft Fourth Five Year Plan (1969-74).
Planning Commission New Delhi	Draft Fifth Five Y ear Plan (1974-79).
Project Report Uttar Pradesh Government	Drought Prone Area Programme of Banda District,Vol.I (1974-79).
Town & Country Planning Department U .P.,Lucknow	Regional Plan for Banda-Hamirpur Region (1974-99).

...

APPENDIXES

APPENDIX 'A'

FUNCTIONS AND SERVICES

Name of the Village Location Code No.

Sl. No.	Functions/Services	Whether Function/ Service Exists Yes/No (Number)	If Not, where do People Normally go for the service on the Priority Basie (With Distance)
1	2	3	4
	Education		
1.	Primary School		
2.	Junior High School		
3.	High School		
4.	Inter College		
5.	Degree/Training		
	Health		
6.	Private Medical Practitioner		
7.	Health Assistant		
8.	Child and Maternity Welfare and Family Planning Centre		
9.	Primary Health Centre		
10.	Dispensary		
11.	Hospital		
	Communication		
12.	Request Bus Stop		
13.	Regular Bus Stop		
14.	Bus Station		
15.	Railway Station		
16.	Branch Post Office		

1	2	3	4
17.	Sub Post Office		
18.	Telephone Exchange		
	Market		
19.	Daily Market		
20.	Weekly Market		
21.	Cattle Market		
22.	Fair Market		
	Extension		
23.	Stock-man Centre/ D'Class Dispensary		
24.	Artificial Insemination Centre.		
25.	Goat and Sheep Breeding and Wools Extension Centre		
26.	Veterinary Hospital		
27.	Agricultural Implements, Pesticides, Insecticides, Distribution Centre.		
28.	Seed/Fertilizer Distribution Centre		
	Credit		
29.	Co-operative Society		
30.	Co_operative/ Scheduled Banks		
31.	S.B.I./Nationalized Bank.		
	Administrative & Security Services		
32.	Nyay Panchayat Headquarter		
33.	Kanoongo Headquarter		

1	2	3	4
34.	Block Headquarter		
35.	Police Chauki		
36.	Police Station		
	Miscellaneous		
37.	Ata Chakki		
38.	Kirana Shop		
39.	Retail Cloth Shop		
40.	Ration Shop		
41.	Village Artisan		
42.	Books/Stationary		
43.	Cycle Repair		
44.	Shoe Repair		
45.	Watch Repair		
46.	Radio Repair		
47.	Tea Stall		
48.	Sweet Stall		
49.	Electric Goods		
50.	Foot Wear		
51.	Studio		
52.	Diesel/Petrol		
53.	Hotel/Dharmshala		
54.	Wood Sawing		
55.	Medicine Shop		
56.	Auto Repair		
57.	Cinema		
58.	Optical Shop		
59.	Jewellery		

APPENDIX - B

LIST OF VILLAGES

S.No.	Location Code No.	Name of Circle/ Settlement	Area (in acres)	Population 1981
1	2	3	4	5
	K.C.Sardhua			
1.	1.	Bilas	1352	800
2.	2.	Chillimal	5470	2414
3.	3.	Chandi	350	865
4.	4.	Tirdhumai Gangoo	1585	999
5.	5.	Dhaurahra	785	457
6.	6.	Bardwara	4115	2527
7.	7.	Birdhumai Surki	2042	1422
8.	8.	Lamiyari	780	721
9.	9.	Gadauli	1971	1101
10.	10	Raipurwa	503	310
11.	12.	Audaha	1758	1999
12.	13.	Gauhani Khurd	235	Uninhabited
13.	42.	Panauti Muafi	1285	1085
14.	51	Sardhua	5174	4549
15.	52	Mirzapur	997	811
16.	53	Sursen	3091	1864
17.	54	Arki	2359	2070
18.	55	Mahuagaon	1618	1636
19.	56	Kuseli	966	743
20.	57	Baria	106	Uninhabited
21.	58	Atrauli Muafi	1460	974
22.	59	Naini	1387	808
23.	60	Gurgaula	540	339
24.	61	Biharwa	752	1172
25.	62	Bakta Khurd	620	722
26.	63	Amwan	406	211
27.	64	Hasta	633	714
28.	65	Dewari	936	945

1	2	3	4	5
29.	66	Bijhaura	131	Uninhabited
30.	67	Surwal	1903	1506
31.	68	Sikri Salis	190	329
32.	69	Khopa	1394	1274
33.	70	Bhadedu	4634	2741
34.	71	Kankota	890	621
35.	72	Udghata	413	466
36.	73	Raipur	912	1007
37.	74	Berasur	688	1022
38.	75	Chilli Rakas	1045	891
	K.C.Parsaunja			
39.	11	Basantpur	184	226
40.	14	Archha Barethi	1865	1898
41.	15	Mamsi Buzurg	2264	1241
42.	16	Darsenda	2596	2237
43.	17	Basahar	1472	462
44.	18	Rampur	465	325
45.	19	Pilkhini	593	494
46.	20	Ora	2953	3046
47.	23	Chaura	3414	2401
48.	25	Nahra	804	903
49.	26	Aghrahunda	632	368
50.	28	Bhanpur	690	770
51.	29	Sidhauli	622	326
52.	30	Beohara	839	739
53.	132	Sakrauli	2009	1274
54.	133	Dighri	368	Uninhabited
55.	134	Dalpatpur	59	Uninhabited
56.	135	Gadraha	74	Uninhabited
57.	136	Kauhari Kapti	661	632
58.	137	Patia Kapti	631	368
59.	138	Khairi	481	287
60.	139	Kaheta Muafi	1016	687

1	2	3	4	5
61	140	Parsaunja	4420	3133
62.	141	Sainpur Muafi	808	854
63.	142	Chilla Muafi	850	722
64.	159	Barwara	750	771
65.	198	Bhaisaundha	5136	3679
66.	199	Baglai	742	1319
67.	200	Bira	312	456
68.	201	Bira Nisf	285	56
69.	204	Itkhari	883	56
70.	205	Hinauta Muafi	1510	1149
71.	206	Kadarganj	1134	783
72.	207	Bara Muafi	1079	1036
73.	208	Dahini	2057	871
74.	209	Pahari Buzurg Sani	1019	726
75.	210	Bhabhaut	1069	630
76.	211	Makri Pahara	727	741
77.	212	Makri Paldeo	597	292
78.	213	Garhi Ghat	2025	956
79.	214	Domankhera	492	284
80.	215	Ramayapur	1296	1143
81.	216	Mahuta Rupauli	643	320
82.	232	Purwa Tarauhan	2408	1932
83.	233	Gopalpur	748	336
84.	234	Khajuriha	575	505
85.	235	Sabhapur	374	317
	K.C.Pahari			
86.	21	Dewal	1136	1028
87.	22	Sarh	497	111
88.	24	Kucharam	970	993
89.	27	Kalwara Buzurg	1951	1340
90.	31	Kalwara Khurd	963	599
91.	32	Kheria	551	376
92.	33	Sikri Sani	494	515
93.	34	Kanti	254	359

1	2	3	4	5
94.	35	Harra	422	289
95.	36	Pahari Buzurg	3747	4043
96.	37	Bakla Buzurg	1434	1300
97.	38	Khutaura	447	Uninhabited
98.	39	Kaundar	549	128
99.	40	Babupur	1075	1089
100.	41	Jariha	516	401
101.	43	Bhatri	1349	749
102	44	Lohda	3510	1783
103	45	Saligpur	565	628
104	46	Sagwara	1958	1581
105	47	Patna Khalsa	630	653
106	48	Kalwalia	336	672
107	49	Patwaria Sani	696	530
108	50	Dundauli	574	400
109	76	Pathramani	652	724
110	77	Piprodar	382	403
111	78	Nonar	1662	1620
112	79	Parsidhpur	758	1029
113	80	Rampuria Sani	125	Uninhabited
114	81	Bachhran	1918	1794
115	83	Jamahil	933	807
116	85	Dholgawan	251	Uninhabited
117	86	Tera Khurd	346	171
118	87	Tera Buzurg	346	171
119	88	Moharwan	572	782
120	89	Kharuhi	316	204
121	90	Surkiha	198	123
122	91	Arjunpur	375	922
123	92	Larhaguthaupur	636	193
124	93	Ladehala	538	155
125	113	Patwaria Awwal	469	Uninhabited
126	116	Kharsenda	1614	785
127	117	Kapna	446	538
128	118	Itaura	1500	1200

1	2	3	4	5
129	126	Pachokhar	1281	1172
130	127	Majhiar	419	256
131	128	Asoh	3281	2001
132	129	Chak Zafar Muafi	779	854
133	161	Tambani	668	679
134	162	Sitalpur Kunhas	283	114
135	163	Dubari	388	403
136	164	Gauri	450	82
137	165	Miran Muafi	535	276
138	166	Bharkorra	540	644
139	236	Rehunta	986	1177
140	K.C.Nandi			
140	82	Gorakoni	582	132
141	84	Rampuria Awwal	740	503
142	94	Chanhat	1408	965
143	95	Hardauli	2499	1989
144	96	Ganiwa Parsidhpur	1187	715
145	97	Lodhaura Buzurg	561	177
146	98	Matipur	347	21
147	99	Nehduawa	265	30
148	100	Gauhani Kala	1222	801
149	101	Nakehli	243	181
150	102	Kandhwania	627	781
151	103	Dadhia	344	310
152	104	Unai Berna	842	694
153	105	Baghwara	1226	540
154	106	Byas Barna	348	394
155	107	Bhatbarna	320	Uninhabited
156	108	Gadwara	793	846
157	109	Bhujauli Muafi	472	435
158	110	Mahuruchh	593	20
159	111	Dehuruchh Muafi	790	559
160	112	Sikaria	628	518
161	114	Nandi	2398	1882

1	2	3	4	5
162	115	Taura	1423	1343
163	119	Chhechheriha Buzurg	780	589
164	120	Chhechheriha Khurd	1101	921
165	121	Burha	403	309
166	122	Semarwar	392	523
167	123	Ranipur Tarauhan	133	Uninhabited
168	124	Balapur Khalsa	151	595
169	125	Kalupur	201	170
170	130	Bhuinhari Muafi	1125	634
171	131	Chakaundh	1002	1117
172	143	Ragauli	2334	1340
173	144	Kanchanpur	229	Uninhabited
174	145	Lachhamanpur	113	Uninhabited
175	146	Lauriha Khurd	752	695
176	147	Lauriha Buzurg	648	331
177	148	Itraur Bhikhampur	602	483
178	149	Banwaripur	301	293
179	150	Kanthipur	329	1017
180	151	Kodpur	422	Uninhabited
181	152	Amarpur	191	51
182	153	Kota	497	60
183	154	Kasahai	1646	2102
184	155	Sapaha	1094	1039
185	156	Ladhwara	1931	1093
186	276	Basila	1113	847
187	277	Atrauli	600	451
188	278	Bhabh Muafi	286	192
189	279	Kuin	872	742
190	280	Akbaria	739	260
191	281	Chak Gaura	133	105
192	282	Deokali	1106	887
193	283	Jamhili	651	465
194	289	Ahira	412	652

1	2	3	4	5
195	290	Magarhai	410	382
196	291	Bandha	579	364
197	292	Paikaura Muafi	927	447
198	K.C.Karwi			
198	157	Chhipani Bahar Khera	980	608
199	158	Bandhuin	741	474
200	160	Bhita Khera Kandi Khera	632	783
201	167	Bankat	898	1008
202	168	Karwi Muafi	952	1698
203	174	Gadhiwa	730	336
204	179	Ghuretanpur	1725	1496
205	180	Manpur	1631	637
206	181	Khamariha	1834	964
207	182	Kolhuwa Muafi	294	95
209	183	Bandari	731	524
210	184	Sirkhori	287	207
211	186	Dholbaja	223	249
212	187	Sabhapur	374	388
213	188	Barachh	1211	479
214	189	Pitupur	190	Uninhabited
215	190	Mainhai Muafi	964	1099
216	191	Sheorampur	647	1353
217	192	Pathraundi	934	1060
218	193	Machhariha	299	660
219	194	Bhanga	262	Uninhabited
220	195	Pandari	1010	903
221	196	Raipurwa Muafi	791	1231
223	197	Taraon	1163	1458
224	202	Kalla	311	555
224	203	Chakla Guru Baba	482	468
225	217	Kapsethi	532	967
226	218	Gobaria	202	55

1	2	3	4	5
227	219	Chandra Gahna	360	547
228	220	Amanpur	525	812
229	221	Narayanpur	1534	441
230	222	Chakmali	86	120
231	223	Dilaura	1479	920
232	224	Barkol	51	Uninhabited
233	225	Katra Gudar	36	394
234	226	Tarauhan (Rural)	973	231
235	227	Khutaha	461	781
236	228	Ranipur Bhatt	623	474
237	229	Ahmadganj	522	208
238	230	Bhabhai	1330	1159
239	231	Chakla Rajrani	232	115
240	237	Bharatpur Pahra	675	468
241	238	Bharatpur Taraon	810	663
242	239	Bharatpur Bhisaundha	531	525
243	240	Rampur Muafi	144	193
244	241	Bharthaul	1674	1274
245	242	Bihara	1560	1951
246	243	Aminpur Chheolaha	1360	235
247	244	Hariharpur	624	826
248	245	Sheorajpur Muafi	243	228
249	246	Mawai Pahra	379	102
250	247	Mawai Taraon	202	69
251	248	Sheorajpur Pahar	69	Uninhabited
252	249	Pahra	3065	3156
253	250	Bhikhampur	1261	347
254	251	Baihar	732	766
255	252	Dugwan	491	845
256	253	Rampur Paldeo	808	143
257	254	Mukundpur	1429	863
258	255	Kharaiha	336	289
259	256	Khohi	875	2012

1	2	3	4	5
260	257	Chhapra Muafi	1125	1283
261	258	Sangrampur	510	725
262	259	Barampur	127	387
263	260	Harsauli	227	Uninhabited
264	261	Ranipur Khaki	340	508
265	262	Balapur Muafi	243	370
266	262	Bandar Kol	253	329
267	264	Chak Kohasar	134	39
268	265	Chak Bhupat	253	374
269	266	Tharri	288	404
270	267	Bhaganpur	459	640
271	268	Semaria Jagannathbasi	868	1239
272	269	Chakla Chak Mongan Muafi	13	Uninhabited
273	270	Chak Mongari Muafi	37	Uninhabited
274	271	Babupur	620	Uninhabited
275	272	Sitapur	1413	1269
276	273	Chitra Gokulpur	472	1248
277	274	Chakla Sitapur	29	Uninhabited
278	275	Qila Bag	60	Uninhabited
279	K.C.Bhaunri			
279	169	Khoh	2232	1707
280	170	Pahi	616	803
281	171	Kolgagahiya	2055	1313
282	172	Margadpur	626	232
283	173	Banari	997	757
284	175	Sidhpur	2537	825
285	176	Sitalpur Tarauhan	1901	816
286	177	Rehuntia	1278	933
287	178	Semaria Charandasi	569	750
288	284	Ajaura	647	37
289	285	Bhaunri	5766	5004
290	286	Beur	1416	1342
291	287	Kotilhai	835	666

1	2	3	4	5
292	288	Baghaunda	450	484
293	293	Dhan	320	394
294	294	Barhat	898	300
295	295	Ghusurra	239	Uninhabited
296	296	Kairikatnasa	392	104
297	297	Raipura	2266	3242
298	298	Barachhi	576	486
299	299	Batkhura	1360	194
300	300	Gauriya	555	811
301	302	Gahora Khas	803	450
302	303	Gahora Pahi	993	310
303	304	LaurihaMuafi	583	524
304	305	Kaubra	2596	2423
305	306	Aghrahunda	6266	2444
306	307	Bagrehi	1688	1080
307	309	Char	739	1120
308	310	Basawanpur	189	194
309	311	Arwara	600	891
310	312	Pah Kanjari	339	331
311	313	Rampur Tarauhan	679	491
312	314	Takhtupur	355	203
313	315	Kharaundh	2193	2063
314	316	Garhi Khurd	172	192
315	317	Semardeha	3216	2236
316	318	Ainchwara	3250	2356
317	319	Garhi Kala	575	439
318	320	Madna	1341	912
319	321	Chardaha	1310	630
320	323	Hanuwan	4175	2250
321	324	Saraiyan	40 33	2926
322	325	Rampuria	1136	133
323	326	Chandramara	6148	220 4
324	331	Jhilang	372	168

1	2	3	4	5
		K.C.MANIKPUR		
325	301	Desah	2505	148
326	30 8	Odki Muafi	438	583
327	322	Garhchapa	12797	3122
328	327	Rukma Khurd	3537	1803
329	328	Chheriha Buzurg	4599	231
330	329	Karka Pandaria	3312	1286
331	330	Bahilpurwa	1207	191
332	332	Madaiyan	7425	2726
333	333	Kailaha	942	1255
334	334	Rukma Buzurg	6637	2567
335	335	Dadri Muafi	3567	1808
336	336	Tikaria Jamunihai	7746	1079
337	337	Mangawan	1033	827
338	338	Gursarai	2262	62
339	339	Itwan Dudaila	7058	3392
340	340	Bambhia	1201	463
341	341	Kusumi	1623	198
342	342	Donda	10611	967
343	343	Bheda	877	448
344	344	Markundi	578	647
345	345	Amchur Nirua	2072	405
346	346	Kehunia	2103	2057
347	347	Kulmar Parasin	4877	Uninhabited
348	348	Chheriha Khurd	973	1133
349	349	Zaro Muafi	3086	569
350	350	Chitghati	188	67
351	351	Kalyanpur	6026	996
352	352	Tharri	531	33
353	353	Sahelwar	144	Uninhabited
354	354	Pandari Muafi	544	10
355	355	Mahuli	1232	40
356	356	Barah Muafi	1629	1389

1	2	3	4	5
357	357	Nandvania	1003	139
358	358	Chulhi	3184	42
359	359	Bairahana	372	23
360	360	Rampur Kalyangarh	2060	1061
361	361	Naglar	256	581
362	362	Chak Shekhapur	6	Uninhabited
363	363	Shekhapur	484	264
364	364	Karauhan	2241	1077
365	365	Manikpur (Rural)	1335	21
366	366	Sarhat (Rural)	1842	325
367	367	Pata	394	354
368	368	Jhari	2007	48
369	369	Sahdol	603	Uninhabited
370	370	Zabardasta	1330	Uninhabited
371	371	Umri	1619	273
372	372	Khichi	395	711
373	373	Kalwalia Mahuliya	990	26
374	374	Ailaha Barhaiya	4044	931
375	375	Chureh Kesarua	4163	3246
376	376	Nihi	6457	645
377	377	Uldan	1565	Uninhabited
378	378	Para	1003	81
379	379	HEla	420	521
380	380	Goberhai	1332	257
381	381	Bagdari	565	850
382	382	Unchadih	13147	3040
383	383	Kota Kandaila	8762	1634
384	384	Maugurdari	1482	535
385	385	Ranipur Kalyangarh	3869	893
38 6	386	Jiganwah	1746	37
387	387	Dadhwar	820	9
388	388	Kubri	675	131
389	389	Giduraha	1881	603
390	390	Kathauta	3786	Uninhabited
391	391	Sakraunha Mamania	4818	898

APPENDIX - C

LIST OF PLANTS MENTIONED

Common Name	Botanical name
Achar	Buchanania lanzan
Amla	Embelica Officinabs
Arjun	Terminalia arjuna
Babul	Acacia arabica
Bel	Aegle marmelos
Ber	Zizyphus mauritiana
Chhiula(Dhak)	Butea monosperma
Dava	Anogeissus latifolia
Duddhi	Holarrbena antidysentrica
Gobdi (Gabdai)	Cochlospermom religiosum
Ghont	Zizyphus oxylopyrus
Gular	Fucus glomerata
Gurja	Lannea coromandelica
Harra	Terminalia beterica
Jharberi	zizyphus nunmularia
Karaunda	Carissa opaca
Kareel	Capparis decidua
Karghai	Anogeissus pendula
Katha Jamun	Syzygium heyneanum
Khair	Acacia catechu
Khirni	Manilkara hexandra
Ku_babul	Leucaena leucocephela
Kulloo	Sterculia urens
Mahua	Madhuca indica
Mussel	Iseilema laxum
Neem	Azadirachta indica
Parwa	Heleropogon contertus
Reunja	Acacia laucophlae
Sagaun	Tectona grandis
Sal	Shorea robusta
Salai	Boswellia serrata
Sandan	Ougenia oojeinensis
Semal	Salmalia malabarica
Tendu	Diespyros tomenlosa
Thuar (Thuhar)	Euphorbia nivulia

**

APPENDIX - D

LIST OF FOREST BLOCKS

Karwi Range - (1) Kolhuwa, (2) Barachh, (3) Aminpur Chheolaha (4) Sidhpur, (5) Gopalpur, (6) Bhabhai, (7) Semandaha, (8) Pandari, (9) Balmiki, (10) Batkhura, (11) Aghrahunda, (12) Modna, (13) Pathraundi, (14) Pahra (15), Bharthaul, (16) Kharaundh, (17) Chandramara, (18) Sitapur, (19) Utarwan (20) Matdar, (21) Banari, (22) Manpur, (23) Qila Muafi, (24) Hanuwan (25) Dugwan, (26) Khoh (27) Purwatarauhan, (28) Rukma Khurd (29) Dahini, (30) Raipurwa Muafi.

Markundi Range - (31) Amchur Nirua, (32) Bheda (33) Chauri (34) Donda (35) Dadri, (36) Guru Sarajm, (37) Tikaria, (38) Jamunihai, (39) Madaiyan, (40) Dadri Muafi, (41) Bambhia (42) Chheriha Kala (43) Chheriha, Khurd, (44) Itwa, (45)Kulmar P arasin, (46) Rukma, (47) Karka,Pandaria.

Manikpur Range - (48) Ailaha Barhaiya (49) Deori (50) Uldan (51) Nihi (52) Garhchapa (53) Mamania (54) Maugurdari (55) Zabardasta (56) Sarhat (57) Marwari, (58) Kalyanpur (59) Katra, (60) Karauhan, (61) Shekhapur Chitghati, (62) Church Kesarua (63) Nahra (64) Ranipur Kalyangarh (65) Mahuli (66) Chulhi (67) Sahdol (68) Dhaurahra (69) Jhari.

...

APPENDIX E

PROPOSED INDUSTRIES

Sl.No.	Name of the Centre	Proposed Industries
1	2	3
1.	Chitrakoot Dham(Karwi)	Dal & Rice Mill, Bakery, Straw Board, Tannery for glacelid and fancy leather, Footwear and Leather article, Bone crushing mill, Brush making, Blankets & Woollen work, Carpet weaving, Non edible oil, Paper, industry, Wooden packing cases, Aluminium utensils, Rolling shutters, Agricultural Sanitary wares, Cement pipe, Cloth Printing Cosmetics, Plastics, & rubber goods.
2.	Manikpur	Dal & Rice mill, Bakery, Bone crushing mill, Footwear & Leather article, Non edible oil, Biri making, Hard board, Khair, industry, Ayurvedic medicines, Bamboo articles, Aluminium foils & articles, Rolling shutter, Agricultural implements, Safe, Steel furniture, Lime industry, Sanitary ware & Ceramic, Paints & Varnish, Soap making, Agarbatti Ink, Ice factory & Ice candy, Candle wax, confectionary, Readymade garments.
3.	Pahari	Dal and Oil mill, Tannery, Footwear Blankets and Woollen work, Bamboo articles, Agricultural implements, Cement jali, Tiles and Clay pots, Ice cream and ice Candy, Soap making, Candle making, Readymade garments.
4.	Sardhua	Dal and Oil mill, Tannery, foot. wear, Bone crushing mill, Blankets and woolen work, wooden furniture, Saw milling, Agricultural implements, Tiles and Clay pots Ice Cream and ice candy, soap making, Readymade garments.

1	2	3
5.	Sheorampur	Dal and Oil Mill, Footwear, Saw Milling and wooden furniture, Agricultural implements, Cement jali, Building, Stone, Porcelain articles, Soap making, Candle making.
6.	Bhaunri	Dal, Oil and flour mill, Tannery, Bone crushing mill, Carpet weaving, Wooden furniture and Saw milling, Ayurvedic medicines, Biri making, Bamboo articles, Safe, Agricultural implements, cement jali, Tiles and Clay-pots, Soap making, Ice Cream and ice candy, Readymade garments.
7.	Raipura	Dal Mill, Footwear, Non edible oil, Bamboo article, Wooden furniture and Saw milling, Agricultural implements, Candle wax, Readymade garments.
8.	Ainchwara	Footwear, Nonedible oil, Wooden furniture and Saw milling, Ayurvedic Medicine, Bamboo article, Biri making, Cement jali, Soap making, Candle wax, Ice Cream and Ice Candy.
9.	Bardwara	Cottage industry-Carpentary, Blacksmithy, Footwear, Basket making, woollen work, Tiles and pots.
10.	Bhaisaundha	Footwear, Carpentary, Blacksmithy, Basket making.
11.	Ora	Footwear, Carpentary, Straw board.
12.	Rukmakhurd	Footwear, Carpentary, Blacksmithy, Biri, making, Khair making.
13.	Khohi	Footwear, wooden toys, Carpentary, Cement jali.
14.	Parsaunja	Footwear, Carpentary, Straw board, Blacksmithy, Tiles & Clay Pot.
15.	Bhadedu	Footwear, Carpentary, Woollen work Basket making.

1	2	3
16.	Lohda	Footwear, Tiles & Clay Pots, Saw Milling and furniture.
17.	Chakaundha	Foot wear, Carpentry, Basket making, Saw milling and furniture.
18.	Markundi	Tannery, Footwear, Wooden,work and Saw milling, Bamboo article,Biri making, Khair making.
19.	Saraiyan	Tennary, Footwear, Carpentry, Birimaking.
20.	Bachharan	Footwear, Straw board, Carpentry, Basket making.
21.	Nandi	Footwear, Woollen work, Carpentry, Basket making.
22.	Ghuretanpur	Footwear, Basketmaking,Blacksmithy.
23.	Unchadih	Tennary, Footwear, Bamboo article, Biri making.
24.	Sitapur	Carpentry, Bamboo articles,wooden toys.
25.	Itwa Dudaila	Footwear, China clay articles, Bamboo articles, Carpentary.

••